SCIENTIFIC AMERICAN

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A Chance for Inventors.

An admirable opportunity for inventors is afforded by the necessity of the government of India, which demands some economical substitute for the wooden telegraph poles that so quickly decay in that climate; and the matter is one of more than ordinary interest, because of the rapid extension of telegraph lines there and the great probability of their large and immediate increase.

Iron telegraph poles have, it is true, been substituted for wooden ones in a number of instances, but neither the cost nor style of them gives satisfaction; what is sought for is a cheap tapering post, light enough for convenient handling, and strong and durable enough to withstand the climatic changes of the country.

These conditions are not yet satisfactorily filled by any of the present designs, and it seems evident to us that they can be only by a machine made post. For a combination of lightness and strength with cheapness, perhaps nothing could excel a post made of strips of iron wound spirally, and well locked and riveted; we have seen straight pipes made in this manner by machines, both here and in England, but they have not been approved of for the purposes alluded to because of their shape.

And in England especially the iron ship building interest seeks for a machine made tapering iron tube for masts and spars, for the manufacture of them now involves too much hand labor, and consequent expense, to satisfy the builders, and they are ready to welcome the invention that will fill their requisitions. Here, too, the demand would doubtless be great enough to well reward the inventor, while the lighter and smaller tapering tubes would meet with ready sale for flagstaffs, fence posts, and numberless other purposes.

THE DELAWARE SHIP CANAL.

The long talked of ship canal to connect Chesapeake Bay with Delaware Bay, and shorten the water route from Baltimore to New York and Europe some 225 miles, seems likely now to become a reality. The estimated cost of the canal—17 miles long, 100 feet wide, and 25 feet deep—is $4,000,000; and the promoters claim that the present commerce of Baltimore would give to the canal an income of $800,000 from the authorized rate of toll, 20 cents a ton. The canal is to follow the valley of the Sassafras, and be without locks. By means of it vessels will be enabled to make three voyages between New York and Baltimore in the time now required for two, and the route will be much safer.

AMERICAN INVENTIONS IN BAVARIA.

We have received through the kindness of Mr. James M. Wilson, U. S. Consul at Nuremberg, a finely illustrated descriptive catalogue of the American tools and small mechanical devices on exhibition in the Industrial Museum of that city. The collection was made by the secretary of the institution, Dr. Seelhorst, who was one of the Royal Bavarian Jurors at the Centennial Exhibition. Impressed by the ingenuity and practical value of American inventions, Dr. Seelhorst not only collected a large number of the more portable specimens for the museum, but has since spent much time in pointing out to the manufacturers and artisans of Bavaria, in public lectures and otherwise, the special excellences of American products in this line. The catalogue gives with each figure the name of the inventor and the post office address of the American manufacturer.

EDISON'S MEGAPHONE.

From the time of the first man until now, men have endeavored to circumvent nature so as to grasp that which the unaided faculties could never attain. We have telescopes for viewing remote objects, microscopes for making visible the minute, telephones for talking over immense distances, and now, at last, we have a megaphone, which is to the ear almost what the telescope is to the eye, or the telephone to the vocal organs.

The speaking trumpet, which, for two centuries at least, has been employed to direct sound so that it may be heard over a long distance, is much used at sea, and is often em-

[*Continued on page* 114.]

EDISON'S MEGAPHONE.

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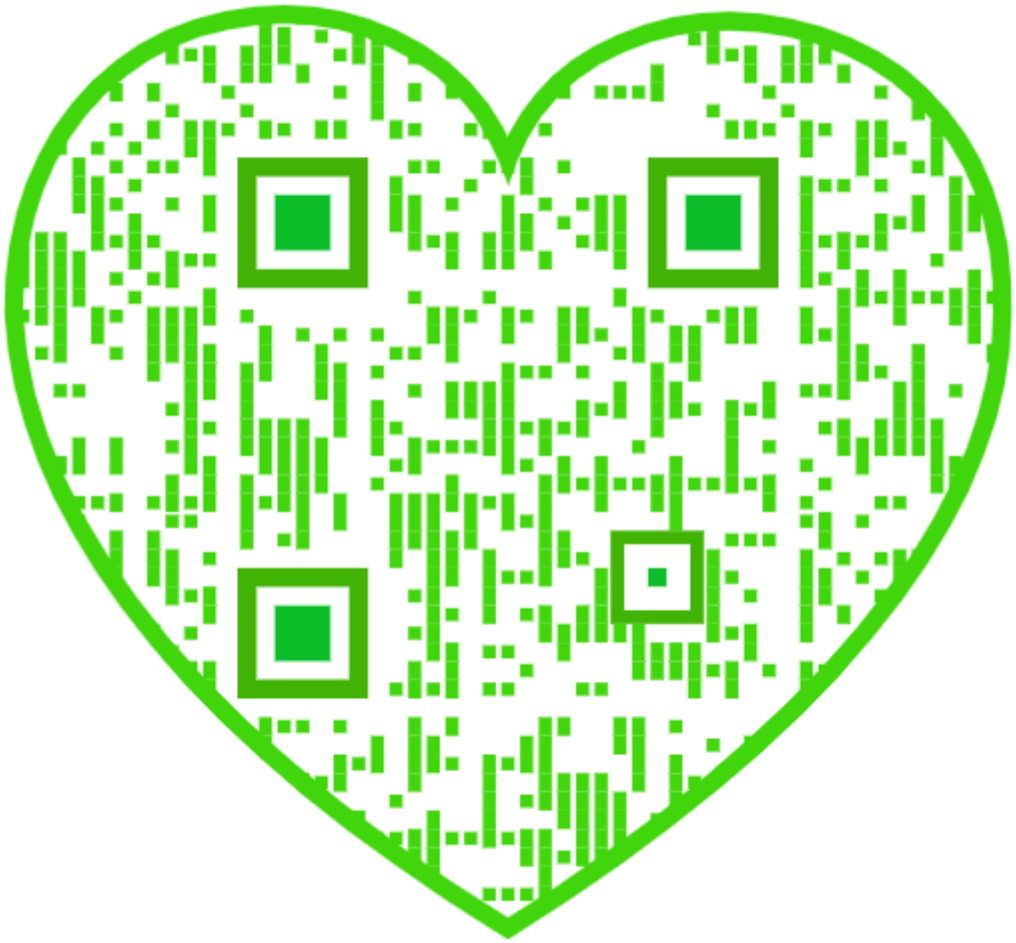

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NEW YORK, SATURDAY, AUGUST 24, 1878.

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EDISON AND THE UNSEEN UNIVERSE.

Hitherto man's knowledge of the extent of the universe has been bounded by the limits of vision. During the day, when the range of sight is narrowed by the sun's excessive brightness, we see but a minute fraction even of the little world we inhabit. At night a wider reach of vision is possible, and some thousands of stellar and planetary bodies are added to the domain of positive knowledge, thus enlarging enormously man's idea of the magnitude of the universe. But the increase of knowledge which darkness reveals is almost infinitesimal compared with the wider view of the universe opened up by the telescope; and every addition to the telescope's penetrative power brings a larger and larger universe within our ken.

That the most powerful of telescopes enables us to reach the limit of the universe no one imagines. See as much as we may, more—perhaps infinitely more—lies beyond. So, at least, all experience leads us to infer; but our positive knowledge ends with the limit of vision.

Must this always be so? Hitherto science has given no hint of the possibility of exploring the vast and mysterious beyond, from which no visible ray of light has ever been detected, or is ever likely to be detected, by the most far-reaching and sensitive of optic aids. But now there comes a promise of an extension of positive knowledge to fields of space so remote that light is tired out and lost before it can traverse the intervening distance. A new agent or organ of scientific sense for space exploration has been given to the world in the tasimeter, by which it is possible not only to measure the heat of the remotest of visible stars, out, Mr. Edison believes, to detect by their invisible radiations stars that are unseen and unseeable! Mr. Edison's plan is to adjust the tasimeter to its utmost degree of sensitiveness, then attach it to a large telescope, and so explore those parts of the heavens which appear blank when examined by telescopes of the highest penetrative power. If at any point in such blank space the tasimeter indicates an accession of temperature, and does this invariably, the legitimate inference will be that the instrument is in range with a stellar body, either non-luminous or so distant as to be beyond the reach of vision assisted by the telescope; and the position of such body can be fixed and mapped the same as if it were visible. Seeing that the tasimeter is affected by a wider range of etheric undulations than the eye can take cognizance of, and is withal far more acutely sensitive, the probabilities are that it will open up hitherto inaccessible regions of space, and possibly extend the range of our real knowledge as far beyond the limit attained by the telescope as that is beyond the narrow reach of unaided vision. Possibly too it may bring within human ken a vast multitude of nearer bodies—burnt out suns or feebly reflecting planets—now unknown because not luminous.

IMPROVEMENTS NEEDED IN SALT MAKING.

Judging from articles in some of our recent exchanges the salt manufacturers of Syracuse, who have so long enjoyed a monopoly, are beginning to recognize the fact that the methods which have so long prevailed for the manufacture of this commodity require considerable modification in order to encourage continued or further investment of capital; that the conservatism which has for so many years held fast to the old system, is beginning to find that it is too crude and expensive for these times of sharp competition in the business, and is at last not indisposed to admit that some change might be advantageous.

The salt block of to-day consists of a horizontal brick flue 90 to 110 feet long, or thereabouts, having at one end from 50 to 75 square feet of grate surface, and at the other an upright smoke stack, while arranged all along on the top of this flue are open circular iron pans for the evaporation of the salt water.

When in operation a large amount of soft coal (two or three tons) is kept burning on the grate in order to produce sufficient burning gas to fill the flue throughout its length; but of course the pans at the grate end evaporate the water four or five times more rapidly than those at the other end. The water in the pans is constantly replenished until several inches of salt are deposited, which is then removed with shovels, and the evaporation renewed.

The excessive consumption of fuel and the unequal temperature in the flue are the most immediately apparent objections to this method, but one of no less importance lies in the fact that the deposit in the pans of several inches of salt constitutes such a non-conductor of heat that a large portion of the thermal value of the fuel used is lost.

The two first objections may be overcome by improved methods of firing; one of which would be to build a cylindrical fireplace (which should be fed from the top), lined with a coil of pipe for superheating steam, then to make within it a fire of anthracite culm, and force up through the burning coals a jet of the hot steam, which, first passing through the coil, should carry with it into the mass of fuel sufficient air to maintain active combustion. The steam, taking air with it, becomes decomposed by passing through the hot coals, and creates a very high temperature and a long and full hydrogen gas flame, which, extending throughout the length of a "block," would secure a far more equable heat than is now done.

This method of firing was in successful practice and brought to our notice eighteen years ago at certain experimental works in Philadelphia, but since then we had heard nothing of it until, quite recently, we find it is strongly advocated by scientists in England.

Another method of very economical firing for salt works would, in our opinion, be found in the use of pulverized bituminous coal, by which a great saving in cost and amount of fuel, and a long, hot flame throughout the flue, could be secured; and this plan, we understand, is about to be tried by parties in Pomeroy, Ohio.

The objection to the use of pans for evaporation has been removed by substituting for them revolving cylinders, whose continual movement prevents the local deposit of the salt and thereby greatly economizes or makes of use the volume of heat now lost. The expense of the plant for this system seems to be the only bar to its general adoption.

THE NEW PATENT LAW OF SPAIN.

The splendid exhibit which Spain and the Spanish colonies displayed at Philadelphia was a surprise to many. For a century or more the curse of bad government had weighed so heavily upon the industries of that once powerful country that the recovery of its former standing among nations was regarded by most people as practically hopeless. The numerous prizes won by Spain at the Vienna Exhibition, however, had clearly indicated that the period of Spanish decadence had come to an end, and that the spirit of the nineteenth century had at last, though tardily, gained a lodgment there. The energy and industrial earnestness manifested in connection with the Centennial Exhibition proved that Spain was becoming once more a power in the world—industrially if not politically. A further and if anything more striking evidence that the country is in earnest in regard to industrial progress is seen in the patent law which has just gone into operation.

Hitherto patents have been granted in Spain only under such onerous conditions as to practically exclude the majority of inventors, foreign inventors especially, from any share in the very limited benefits offered. The new law is comparatively liberal, placing foreigners on the same footing as natives, and the interests of the inventor are well protected. The duration of patent rights has been largely extended, the fees have been greatly reduced, and a single patent now covers not only Spain, but all the Spanish colonies—the Balearic Islands, the Canaries Cuba, Porto Rico, the Philippines, and Fernando Po.

Heretofore separate patents had to be taken out for each of these possessions, each costing several times more than is now charged for all. Certificates of additions, covering any improvement or modification of patents, are granted any time within the first year; and subsequently the inventor is given the preference for new patents on improvements. Patents may be inherited, sold, or donated, the same as other property. The time allowed for the official working of patents is extended from one year to two. Infringements are punishable by fines, confiscation of machinery and products for the benefit of the patentee, and, if repeated, by imprisonment. The life of a patent has been extended to twenty years.

Inventors and manufacturers will readily appreciate the value and importance of the field laid open to them by this law—certainly that part of it embraced in the Spanish West Indies. The commercial relations of our country with Cuba and Porto Rico are steadily increasing in scope and value, and the nearness of those islands to us must ultimately give us the command of their markets.

The protection which patented inventions now enjoy there cannot but prove of signal advantage to our manufacturers in many ways, not the least of which may be the shutting out from Spanish-American markets of British and German counterfeits of American products, by which Americans have so long suffered, in pocket as well as in credit.

As our readers are doubtless all aware, the publishers of this paper are also solicitors of American and foreign patents. Their advertisement, with special reference to Spanish patents, in another column, will be of interest to inventors and manufacturers.

LOCAL ENCOURAGEMENT OF MANUFACTURES.

A member of the Baltimore City Council proposes to that body the appointment of a permanent commission of prominent citizens, whose special duty shall be to promote the establishment of manufactures in that city. Among the means proposed for securing that end is the proffer of sites for manufacturing establishments at low rates, the exemption from municipal taxation of the buildings and machinery used, and the granting of special water rates. Speaking of this proposition the Baltimore *Sun* pertinently remarks that except in rare instances and under peculiar circumstances it is always by a combination of manufactures and commerce that cities grow populous and wealthy. Every new manufacturing establishment brings an accession of citizens—who require additional houses, and whose wants must be supplied by additional artisans and shopkeepers. The wealthiest States are the manufacturing States, and they are the ones which sustain a numerous population. Rhode Island, for example, depending almost entirely upon manufactures, has a larger population for its area than any other in the Union. So with cities. Philadelphia, which until recently has had no foreign commerce worth speaking of, has grown populous and wealthy within a little more than thirty years through the numerous manufactures that have been established within her limits.

The gathering of eight or ten thousand inhabitants about the mills and manufactories in the suburb of Baltimore known

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as Woodberry is looked upon in that city as an earnest of what might be done on a larger scale for the city's growth and prosperity by increasing the number of its manufacturing establishments. If, as the *Sun* remarks, the hearty cooperation of every citizen will be given to whatever effort may be made to increase the manufactures of Baltimore, there can be no doubt that intending manufacturers will take the advantages offered into careful consideration

INDEPENDENT WORKERS.

As the larger industries from the pressure of the times become crippled or paralyzed, it is surprising to note how quickly our American inventors devise machines and appliances for doing in a small way what was before done on a large scale, in factories controlled by capital and employing heavy machinery and a great number of men.

When capitalists fear to invest and the whole manufacturing world is in a state of suspense, the self reliance of the mechanic or artisan is brought to the test. Then each must begin an industry for himself, choosing the particular branch of manufacture with which he is best acquainted.

In these days, for almost every branch of industry, tools and machinery that can be operated single handed are obtainable. With such tools and machinery, and with a reasonable amount of energy, skill, and good judgment, it would rarely happen that a man could not at least earn a livelihood, with the probability of doing much better, and with the satisfaction of being his own master

A thousand energetic men with a thousand light machines would, in many branches of manufacture, prove formidable competitors for a large establishment, employing the same number of men, and especially in the present state of affairs is it evident that the small manufacturers have the advantage over the larger, who now struggle against interest on investments, and are obliged to conduct their business on an unprofitable scale, if at all.

Now, when mechanics and artisans are looking for the dawn of better times, and hoping for the revival of industries, is the time for every workman to become capitalist, president, vice president, secretary, and superintendent. Instead of "waiting for something to turn up" let every workman apply himself to business. We would then have a multiplicity of industries which would increase in importance as the times grow better, and furnish employment while the times are unpropitious.

A CURIOUS INSECT.

Practical entomologists will find a very interesting and suggestive study of a singular phase of insect life in Mr. William H. Gibson's paper on the "House Builder Caterpillar," printed in the current issue of the SCIENTIFIC AMERICAN SUPPLEMENT. Mr. Gibson says that for a dozen successive years he has studied this insect, collecting hundreds of caterpillars and cocoons and watching their transformations. Meantime he has searched in vain for any satisfactory account of the singular features of the reproduction of the insect and the fertilization of the eggs. Harris says that the female never leaves her cocoon. Packard says the same. Gibson says there is no female!

Mr. Wood says of a West India species that the female has no external vestige of wings, and looks more like a grub than a moth, the head, thorax, and abdomen being hardly distinguishable from each other, and adds: "Love and courtship with this insect are carried on quite in an oriental fashion pushed to extremes; for whereas the oriental in many cases never sees the face of his vailed bride until after the nuptial ceremony is completed, the house builder moth never sees his mate either before or after marriage, and so is obliged to love blindly or not at all."

Mr. Packard's account is characterized as "more specific but nevertheless unsatisfactory." He describes the female as wingless, cylindrical, and in general form closely resembling its larva. The fertilization of the female he believes to take place while it is within the case, which it never leaves, and in which the eggs are deposited. This conclusion Mr. Gibson thinks to be based entirely on inference, not at all on observation

According to Mr. Gibson's observations the female larva is transformed, not into a moth, but into a bundle of eggs and a little fuzz, which, under the microscope, reveals forms of wing scales similar to those on ordinary moths. If fecundation takes place at all it occurs either during the caterpillar state, which is improbable, or the fecundative is passed down several generations after the manner of the Aphides. Mr. Gibson illustrates by numerous drawings the various stages in the development of this strange insect, as observed by him. The caterpillar inhabits the arbor-vitæ, larch, hemlock, and the like, sometimes doing much harm to these favorite hedge and shade trees.

NINE ounces—a little more than half a pint—of water may be decomposed into eight ounces of hydrogen gas and one ounce of oxygen gas.

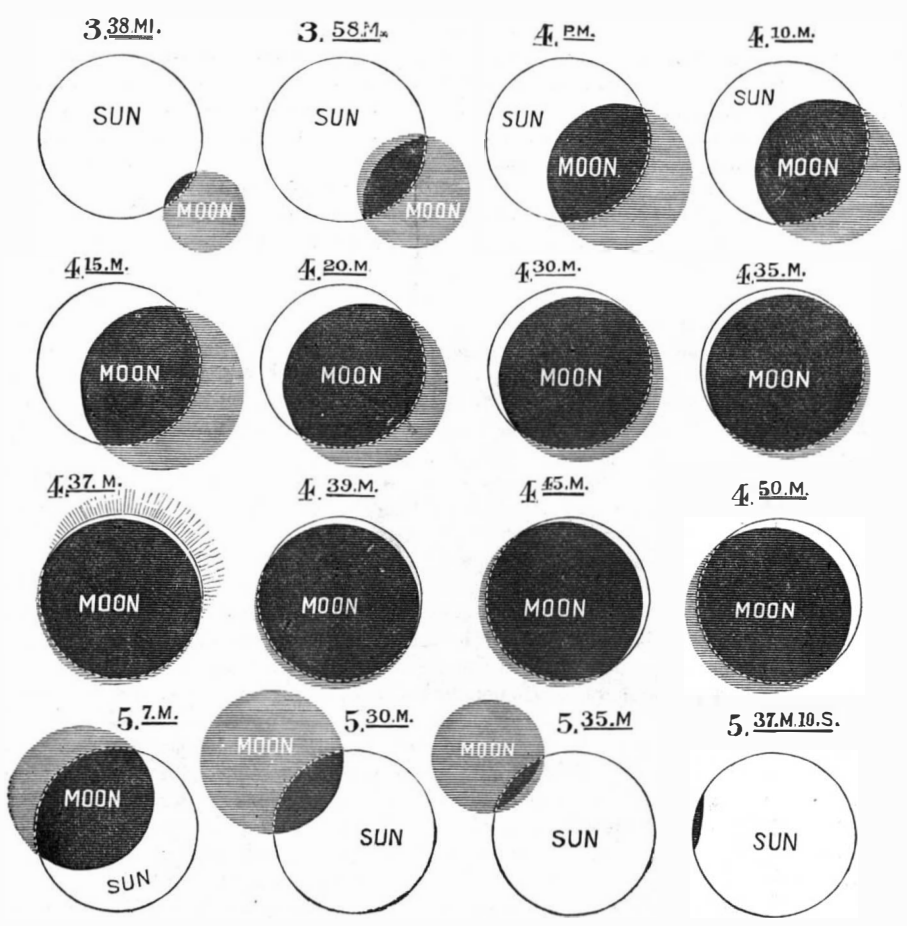
PHOTOGRAPHIC AND OTHER VIEWS OF THE ECLIPSE.

We are indebted to several amateur and professional astronomers for interesting reports of their observations, but have room for only the following:

Fig. 1, a copy of a photograph taken at Indianapolis, Ind.,

by Mr. F. M. Lacey, we owe to the courtesy of Mr. L. T. Stanley of that city. It shows the eclipse as it appeared there at 4h. 51m. P. M. The cloud effects as shown in the photograph are very fine.

Fig. 2 represents a series of diagrams sent by J. B. Jones, M. D., representing the several phases of the eclipse indicated, as observed through an ordinary field glass at Caddo C. H., Indian Territory. The time is that of Sedalia, Mo. From 4:15 to 4:35, the sun was partially obscured by the moon.



In these diagrams the observer has evidently given precisely what he thought he saw; but it is equally evident that he did not see what he represents. We reproduce his drawings as an illustration of the liability of unpracticed observers to misinterpret the testimony of their senses. Of course the observer did not see the full orb of the moon at any time, save at the moment of totality. He saw at each other instant a lenticular spot of black creeping over the face of the sun, increasing in size up to the moment of totality, then regularly diminishing to the end of the eclipse. In his diagrams, however, he has completed the circle of the moon for each phase of the eclipse from the portion visible, and, misjudging the impinging curve, has drawn the curious series of expanding and diminishing moons shown in the cut.

The moral of it all is the uncertainty of individual observation, however sincere, particularly when the observer is not an expert. Had the phenomenon been one of local or unique occurrence, visible to no other observer, such a misreading of facts might have given rise to endless theorizing to account for the real or apparent increase and diminution of the moon's orb before and after totality. Indeed, in earlier times the hottest of controversies have arisen from just such mistakes.

THE ECLIPSE.—A NOTE FROM PROFESSOR MITCHELL.

[The following pleasant note from the head of the Vassar College Eclipse Expedition touches some points not noticed in the press reports.—ED. SCI. AM.]

DENVER, July 29, 1878.

The weather has been all that any one could desire, and the eclipse has been successfully observed.

The brilliancy of the corona far exceeded that of the eclipse of 1869 as observed at Burlington, Iowa, but the rosy prominences were less marked. We obtained a sketch of the corona in oil during the 2m. 40s. of totality.

Mercury, Regulus, and Mars were seen, Venus was very brilliant, Procyon and several other stars were visible. Situated as we were on a lofty plain outside of the city of Denver, the landscape (including, as it does, a long sweep of the Rocky Mountains) was wonderfully beautiful. The sweep of the black shadow was seen as it approached us from the Rocky Mountains, and its retreating darkness was seen to cross the plain to the southeast.

I have been assisted in the day's work by four of the graduates of Vassar, and every facility has been afforded us by the citizens of Denver. MARIA MITCHELL.

THE STUDY OF REAL LIFE IN SCHOOLS.

Referring to the growing custom of using newspapers in the place of reading books in schools, a teacher in the Milwaukee High School, Professor L. Burstall, writes us that for some years he has used the SCIENTIFIC AMERICAN in that way with the most beneficial results. His belief is that a great part of the work of schools, especially of the higher grades of schools, should be to direct the work of students to "real results," to knowledge "that may give them a lift in future years," and fit them to understand that they "ought to be greater, more practical, more decisive than their fathers." For this reason he thinks that too much time is given in the schools to the history of the past, to human conflicts and dynastic struggles, battles, mad strifes, and the victories of hypocrisy and brute force; and too little time to the history of real progress of the present age, the history of the steam engine, the telegraph, and other inventions, the influence of which would be to impel the students to emulate in their lives the men who have lived and labored for the real benefit of humanity.

As the best exponent that he knows of the realism which is the mainspring of our country's success is the SCIENTIFIC AMERICAN, he insists that it ought not only to be on file in all school libraries, but that it should be used as a common reader, for translation and for composition, as a leader for class work and home occupation.

We are not sure but our friend is altogether right Certainly one great fault with current school teaching is that it gives too little attention to, and is too little in sympathy with, the real working and determining forces of the age. As our correspondent puts it, "too much time is given to the knowledge of the past, very little to the present and the future." As a natural consequence, most students leave school not much better fitted for the life of to-day than they would be had they been schooled a hundred years ago and laid away to sleep for a century. The reading of a paper like the SCIENTIFIC AMERICAN in school or at home must do much to correct and atone for this neglect of the scientific conditions and aspects of modern life in the routine work of the schools. While much of the information given is beyond the years of school children, enough of every-day life is covered from week to week, pictorially or otherwise, to make the paper instructive even to the youngest.

One Effect of the Chinese Famine.

The great famine in China has created a sudden and large demand for the cereals of the Pacific slope, and the farmers of that region prosper accordingly. All the steamers from San Francisco now go out fully loaded with flour. Unfortunately many California farmers were deterred from seeding largely by the drought of last year, and the wheat crop of the State is light; but the crop of Oregon is fair in quantity and quality. Already the people of this coast are beginning to feel the revival of trade, and the season promises to be a decidedly favorable one.

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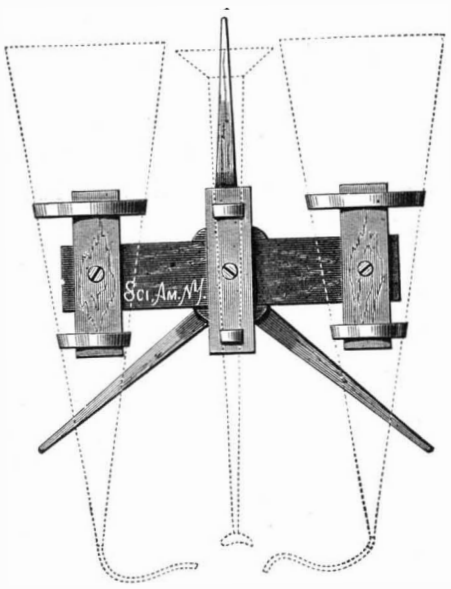
[*Continued from first page.*]

ployed on land to direct vocal sounds so that they may be heard above other sounds. It is tolerably certain that the speaking trumpet is of modern origin, and that it is the invention of Samuel Moreland, 1670.

Kircher, in his *Ars Magna et Umbra* and in his *Phonurgia*, mentions a kind of gigantic speaking trumpet, described



PLAN OF MEGAPHONE.

as the horn of Alexander. According to Kircher, this horn enabled Alexander the Great to call his soldiers from a distance of ten miles. The diameter of the ring must have been 8 feet, and Kircher conjectures that it was mounted on three poles.

Late in the last century Professor Huth, a German, made a model of the horn, and found that it served as a powerful speaking trumpet, but we are considerably in doubt as to the distance through which sounds can be projected through such an instrument.

The ear trumpet, which is the counterpart of the speaking trumpet, has been made in various forms during the last two centuries, but no form yet devised has any advantage over a plain conical tube with a bell-shaped or flaring mouth.

Common forms of ear trumpets are shown at 1, 2. The one at 3 is telescopic; 4 is provided with a diaphragm (shown in dotted lines), which renders the sound less confused, though it does not increase its strength; 5 is a shell having a mouth piece and ear tube; and 6 is a stethoscope. So much for the antecedents of the megaphone.

Professor Edison, in his researches on sound, has made many curious experiments, one of the most interesting of which is that of conversing through a distance of 1½ to 2 miles with no other apparatus than a few paper funnels. These funnels constitute the megaphone, an instrument wonderful both for its simplicity and effectiveness. In the plan view the details of construction are clearly shown, and our large engraving represents the instrument as it stands on the balcony of Professor Edison's laboratory. A mile and a half distant, at the spot indicated by the two birds, there is another instrument exactly like the one in the foreground.

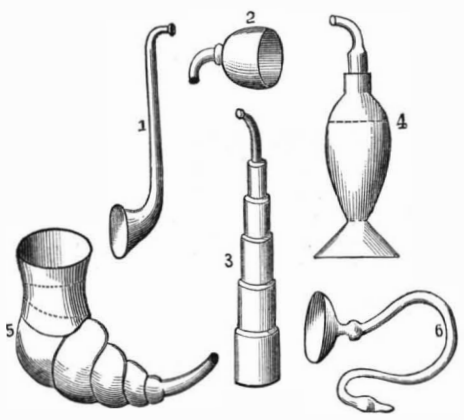
The two larger funnels are 6 feet 8 inches long, and 27½ inches in diameter at the larger end. These funnels are each provided with a flexible ear tube, the end of which is placed in the ear. The speaking trumpet in the middle does not differ materially from the ordinary ones. It is a little longer and has a larger bell mouth. With this instrument conversation can be readily carried on through a distance of 1½ to 2 miles. We have conversed and heard singing through the distance named, although both the singing and talking were in the ordinary tone of voice. A low whisper, uttered without using the speaking trumpet, is distinctly audible at a thousand feet, and walking through grass and weeds may be heard at a much greater distance

American Horse Cars.

A *World* reporter has obtained from the veteran street car builder, Mr. John Stephenson, of this city, a column of interesting facts concerning the origin and progress of street railroads and horse cars throughout the world. The first street car line, the Fourth Avenue, was opened in 1832, and the following year Mr. Stephenson took out his first patent for improvement in car building. No other roads were opened in New York until 1852, when the Second, Third, Sixth, and Eighth Avenue lines were inaugurated. In 1856-7, Boston and Philadelphia adopted street cars, and some years after the leading Canadian cities followed. In 1869 the first street car line outside of America was started by George Francis Train, at Birkenhead, England. The same year a road was built at Buenos Ayres, South America. About the time of the Vienna Exhibition, tramway lines were built at Brussels and Berlin. Very recently they have been adopted in Paris, in Russia, in South America, and almost everywhere in the large cities of the English colonies.

Mr. Stephenson's business is cosmopolitan in scope. He said: "Besides orders for various cities in the Union, we have orders in the shop now from London, Paris, Chorillos, Peru; Hamilton, London, and Toronto, Canada; Port Adelaide and Gawlertown, Australia; Kingston, Jamaica; Lima, Peru; City of Mexico; St. Petersburg, Russia; Wolverhampton, Swansea, Hull, and Liverpool, England; Jalapa, Mexico; Bahia, Brazil; Amsterdam, Holland; Wellington, New Zealand; Berlin, Germany; Rio Janeiro; Christiania, Norway; Hamburg, and many other places. We have an order for twenty-five cars for the North Metropolitan Tramway of London, the largest street railway corporation outside of the United States. There were nineteen competitors for the order."

In answer to the question, "How is it that you can compete with the foreign manufacturer in his own town?" Mr. Stephenson replied: "Shortly after the Hull road had been stocked by us, a Birmingham manufacturer accosted Alderman Bannister, of that city, and asked him why he sent the order for the cars to America. The Alderman replied that the town had patronized American industry because it was found that a better car could be procured for £35 less than the Birmingham man could furnish one for. Our cars weigh less by one half than those made in Germany, and the cars we furnished Glasgow are operated with a stable one third less than their own require. The nature of American woods has much to do with our success. The selection and preparation of material are no light job; the process of preparation requires three or four years. Our object is to obtain strength with lightness. The American irons are tougher than the English, and we can get the required strength with less weight than they can. We use white oak, white ash, poplar, basswood, hickory, beech, maple, and pine—woods all easily procurable by us, while the English are obliged to use principally teak imported from the West Indies. Teak is used largely in ship building, and is always in the English market. The English manufacturer does not seem to possess that quality of discriminating between the different kinds of woods, which long experience has given our firm. The selection of wood is a practical



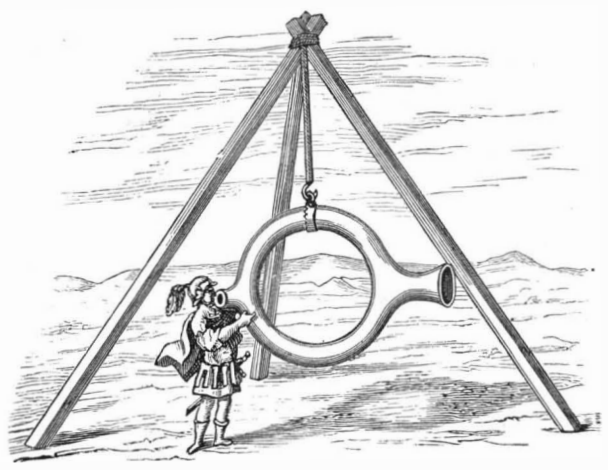
EAR TRUMPETS.

science. Their ideas are heavier than ours, and because their woods are inferior they have been obliged to re-enforce with iron at the expense of lightness. Our raw material is abundant with us and is inexpensive. Then our labor-saving machinery is such that no small establishment can compete with us. We meet with considerable opposition abroad, and the press is used to raise a cry against any corporation sending money away from home, especially in the present hard times." The cost of a modern car, ready for use, was given as from $1,000 to $1,200.

SPEAKING TRUMPET IN THE MERCHANT SERVICE.

Proofs of Prosperity.

With nations, as with individuals, increased income with diminished expenditures is the surest evidence of prosperity. Judged by this standard the United States have been more than ordinarily prosperous the past year. The following comparison of the exports and imports of the country for the year ending July 31, 1878, with those for the previous



THE HORN OF ALEXANDER.

year, are conclusive on this point. The figures are those of the Bureau of Statistics:

MERCHANDISE.

	1877.	1878.
Exports—Domestic	$589,670,224	$680,683,798
Foreign	12,804,996	14,200,402
Total	$602,475,220	$694,884,200
Imports	451,323,126	437,051,533
Excess of exports over imports	$151,152,094	$257,832,667

GOLD AND SILVER (COIN AND BULLION).

	1877.	1878.
Exports—Domestic	$43,134,738	$27,054,985
Foreign	13,027,499	6,678,240
Total	$56,162,237	$33,733,225
Imports	40,774,414	29,821,313
Excess of exports over imports	$15,387,823	$3,911,912

TOTAL MERCHANDISE AND SPECIE.

	1877.	1878.
Exports—Domestic	$632,804,962	$707,738,783
Foreign	25,832,495	20,878,642
Total	$658,637,457	$728,617,425
Imports	492,097,540	466,872,846
Excess of exports over imports	$166,539,917	$261,744,579

Thus, in comparison with last year, the foreign trade of the country shows a gain for 1878 of nearly one hundred million dollars.

FURTHER EVIDENCE OF ATLANTIS.

In "Glimpses of Atlantis" (SCIENTIFIC AMERICAN, July 28, 1877), we reviewed at considerable length the evidence furnished by American geology and paleontology, and the deep sea explorations of recent years, touching the continent that formerly lay where the Atlantic now rolls. Another glimpse of that vanished land is furnished by the eocene deposits of England. In discussing the character and evident origin of those deposits (*Pop. Sci. Rev.*, July, 1878), the English geologist, M. J. Starkie Gardner, shows that throughout the whole eocene period a great river flowed from the westward, its estuary covering at first the southeastern and then the southern part of what is now England. The magnitude of this river, together with the multitude and variety of the flora and fauna brought down by it, and the former total severance of the North Sea from the Bay of Biscay, Mr. Gardner believes, reduce from theory to fact, and in the most positive manner, the assumption that a great extension of land then existed to the west of Cornwall. The extraordinary mingling of American, Asiatic, Australian, and African genera in all European floras of the tertiary periods shows no less conclusively that some communication existed between these several lands in former times.

After showing how this commingling would be made possible by the elevation of the "Dolphin" and "Challenger" ridges, as described in this paper a year ago, Mr. Gardner asserts that, without entering upon the discussion of probabilities, the fact remains that a great tract of land formerly existed where the sea is now, and that Cornwall, the Scilly and Channel Isles, Ireland, and Brittany are the remains of its elevated land. It must at least have been as large as France, Switzerland, and Germany, although unconnected with southern Europe. There is in addition, he adds, an ever increasing mass of botanical and zoölogical evidence showing that the Atlantic Isles formerly must have been portions of a great continent; and Wollaston, from a study of the insects of the Azores, Madeira, etc., quite recently has been able emphatically to reiterate this fact.

The final submergence of the land did not take place until miocene times, and was coincident with the elevation of the Alps.

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Foreign Bodies in the Nose and Ears.

Dr. Mason, in a lecture on the Surgery of the Face, published in the *Lancet*, says that foreign bodies, such as cherry stones, locust beans, brass rings, slate pencils, screws, buttons, pieces of wood, peas, etc., are not unfrequently met with in the aural and nasal cavities of children, and even of adults. Such substances have been known to remain in one or other of these cavities for nearly a lifetime, causing little or no inconvenience. Thus a case is related of a lady from whose nostril a foreign body was dislodged during the act of sneezing. It was found to be a button which had belonged to her little brother when they were both infants. Another case is recorded in which a piece of slate pencil was removed from a woman's ear, and which had been put there when she was at school forty years before. And a third instance, in which a cherry stone had been in an ear for sixty years. A case is recorded of a gentleman, aged forty-one, from whose ear a piece of cedar wood was removed by syringing. The patient remembered distinctly the fact of its introduction when he was a boy at school, at least thirty years previous. No attempt had been made to extract it, and its presence had not troubled him until now. It occasionally happens, however, that a good deal of inflammatory action is set up by the foreign body, as in the case of a girl who was under the author's care in the hospital, to which she had been admitted on account of a small stone in her ear. She subsequently had paralysis of the facial nerve. A case is reported of a child who not only had facial palsy, but died of meningitis, caused by the presence of a locust bean in the ear. Living larvæ have been found in the meatus of the ear. Dr. Routh publishes such a case. The patient was a gentleman who three years before was tormented by a fly near his ear. Convulsions followed the presence of the larvæ, but the patient recovered, although he remained deaf. Dr. Blake, of Boston, has seen four such cases. A case is reported which shows the curious course taken by a pin that had been introduced into the external meatus. It passed through the middle ear, probably along the Eustachian tube, and was extracted by the patient from her throat by hooking it with her finger. There are various instruments employed for removing foreign bodies from the ear, each good in its way—a loop of wire, or a needle with the point just slightly turned up, forceps, or an instrument like that devised by the author's colleague, Dr. Hone. This consists of two pieces of silk covered silver wire, wound together in a single strand, about three inches in length. The whole is insulated and stiffened with shellac, the ends being left loose for connection with a battery and galvanometer; the object of the electrical part being to detect the presence of metallic bodies.

In dealing with foreign objects situated in the external auditory meatus, syringing the passage will often suffice to effect their removal; but in many cases forceps and other instruments must be used, yet they should be employed with the greatest caution. As a rule, if left alone, the substance becomes loose, and falls out on the pillow as the patient lies in bed. In extracting foreign bodies from the ear, M. Debout has recommended that the mouth of the patient should at the same time be kept open. It is sufficient to introduce the end of the finger into the external auditory canal, and to make the lower jaw move, in order to become convinced of the enlargement that the canal undergoes each time the condyle of the jaw is made to move. Dr. Voltilini, in some practical remarks on the subject, says that in the removal of these bodies we should never employ force; not that foreign bodies should always be left in the ear, but that matters should not be made worse by violent manipulations. More recently Dr. Dolby has laid down the very practical law that no attempt should be made to remove a foreign body from the ear unless the auditory canal be thoroughly illuminated. Where this rule is broken, the tympanic membrane will most probably be ruptured, and the life of the patient be thus placed in imminent peril.

Niello.

The composition of the Russian tula, or niello silver, has been hitherto kept secret. According to the *Berliner Tagblatt*, the firm of F. Zacher & Co., in Berlin, have discovered the method of manufacture, and have made it in large quantities. It consists of nine parts silver, one part copper, one part lead, and one part bismuth, which are melted together and saturated with sulphur. This mixture produces the gorgeous blue which has often been erroneously spoken of as steel blue.

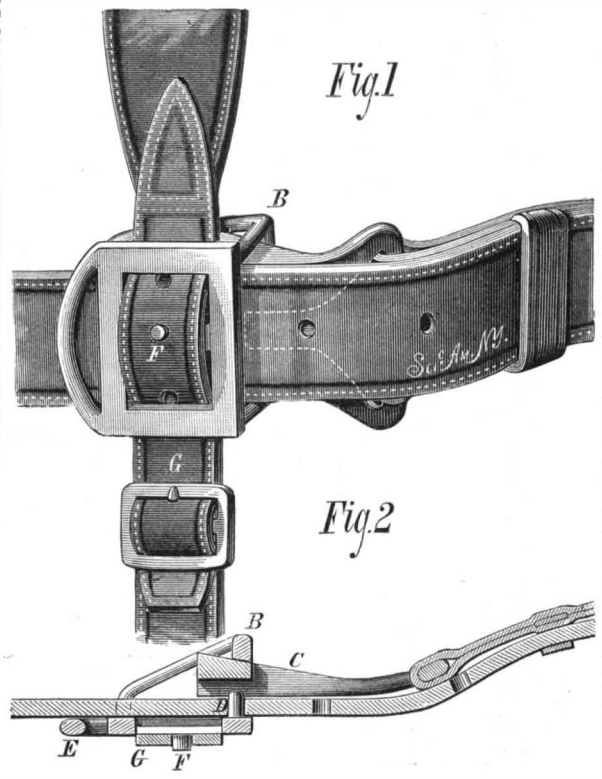
NEW TRACE AND PAD BUCKLE.

Our engraving represents an improved buckle for connecting the traces, hame-tugs, pads, and belly-band of a harness.

The main frame of the buckle is provided with a flange, B, which is slotted to receive the trace and the wedge-shaped block, C. The buckle frame has a rigid tongue, D, which enters a hole in the trace and prevents it from moving out of place before it is fully clamped by the wedge, C. The wedge is grooved longitudinally upon its outer side for the passage of the tongue. Upon the smaller end of the wedge, C, there is a loop to which is attached the end of the hame tug.

The buckle frame has a loop, E, for receiving the side straps of the harness; it also has a central bar from which a rigid tongue, F, projects for receiving the pad strap, G. To the lower end of the pad strap is attached the belly-band.

By this construction, the trace when under tension will be firmly clamped between the wedge block and the buckle frame, so that the entire strength of the material may be utilized in sustaining the draught



BATES' TRACE FASTENING.

For further information, address the inventor, Mr. George E. Bales, Seattle, King Co., Washington Territory.

QUICK SPEED HAND DRILL.

Our engravings represent a new and useful tool for light drilling in wood or metal, invented by Mr. C. L. Belamy, of Arlington, N. J. Its chief parts are a fly-wheel carrying the drill, and a pulley spring and clutch mechanism, all of which revolve loosely on a spindle held stationary by a handle (Fig. 1). The action is as follows: By drawing with one hand a string wound around the drum, the latter and the clutch, together with the fly-wheel and drill, are set in motion at a certain speed. At the same time the spring attached to the drum is tightened. As soon as the tension of the hand holding the string is relaxed, the movement of the pulley is reversed, taking up the slack at the same time. The fly-wheel and the drill do not, however, take part in the reversal of the motion, owing to the action of the clutch. A continuous revolving movement in one direction is thus insured for the drill, the speed varying from 500 to 1000 revolutions per minute. The necessary feed may at all times be felt, and be accordingly controlled by the hand grasping the handle. The drill may be used in any position, and drills of any kind can be inserted.

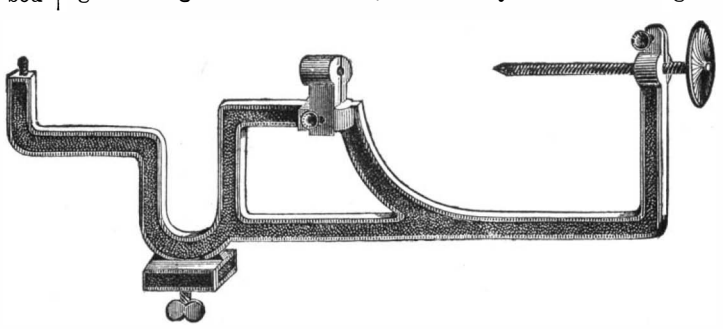


FIG. 2.—BRACKET FOR HOLDING THE HAND DRILL.

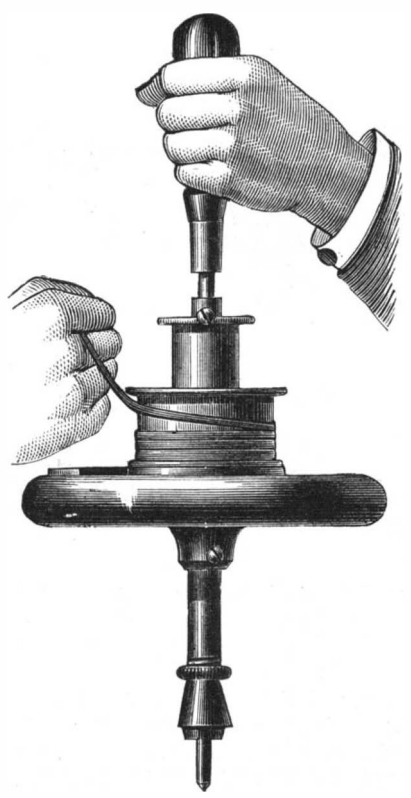


FIG. 1.—QUICK SPEED HAND DRILL

By the use of a simple attachment which is not shown in the cut, the instrument can be so arranged that it may be operated with one hand. Another attachment, shown in Fig. 2, is provided by which the drill can be worked by hand or foot; this consists of a bracket for holding the drill, converting it into a tool similar to a small lathe. The bracket is held by inserting the bottom in the jaws of an ordinary vise. In this case the drill can be used for polishing. The tool is a very neat and effective one, and seems capable of doing a pretty wide range of work.

For further particulars, address James D. Foot, 22 Platt Street, New York.

The "Germ Theory" in its Chemical Aspect.

Some of our principal daily papers, whose mission is, or at least should be, to diffuse useful and correct information among the masses, have succeeded in ferreting out a remarkable French chemist, who, having renounced for a time both his profession and the outer world, has betaken himself to the gloom of an old brewery cellar in Hoboken in order to devote himself to the cultivation of mushrooms. Now in the mere growing of mushrooms for the market there is nothing to call forth particular remark—it is a very laudable and a very honorable business, whether engaged in by a gardener or by an "exiled Frenchman and chemist and a friend of Gambetta;" but when we find the newspaper reporter giving credence to the marvelous fictions of this so-called chemist, and then giving them prominence in a lengthy article, we begin to lose our respect for the "professional" qualifications of both individuals. Of this exiled chemist we are told that, "having seen mushrooms grow in France by supplying the ground with the germs, he set to work to discover their chemical composition and to manufacture them artificially." We are further informed that the experiment is a success and that 150 pounds have been raised in a day, and that no poisonous kinds can possibly get among M. Mezzarelli's plants because nothing enters his "carefully manured soil but the germs which he makes in his little laboratory." This wonderful discovery in agricultural chemistry having duly gone the rounds of the press, we shall be fully prepared to read an account of the brilliant feats of some other exiled foreign scientist in the artificial production of the "germs" or seeds of our entire catalogue of field and garden plants, and the consequent ruin of all our large seed houses. Such a statement would be no less absurd than the former. It is hardly necessary to say that mushrooms and allied plants produce and are developed from small bodies which, although not seeds, are analogous to seeds, and that the manufacture of these is just as far beyond the reach of human talent as that of any other living organism.

The cultivation of these much esteemed delicacies is a remarkably easy matter, requiring neither the intervention of the foreign scientist nor the use of chemically prepared materials to make it a success; and the only wonder is that so simple and so inexpensive a process should not long ago have developed into a prominent industry in this country. To prove that it would be profitable it is only necessary to refer to the immense number of cans of "Champignons" annually imported from France into the United States, and which are held at a price out of all proportion to the costs of production and preparation for the market.

Official Paper.

Professor Reuleaux recently gave a discourse before a commercial meeting at Leipsic, upon the character of the paper employed in the public offices, which he regarded as a striking evidence that the giving of contracts to the lowest bidder exerts an injurious influence. The paper which is now delivered consists almost entirely of wood, and in the course of ten or fifteen years we may reasonably anticipate that the official records, which are of the greatest importance to our families, will be destroyed through the natural processes of decay. Such a serious evil would seem almost incredible if it was not sustained by weighty evidence. But as long as our officials hold to their present course, and so long as they buy only what is cheapest, and what, as a necessary consequence, is also bad, we have no right to anticipate any improvement.—*Pap. Zeit.*

How Grapes Ripen.

According to *Comptes Rendus*, St. Pierre and Magnien have arrived at the following conclusions in regard to the changes which grapes undergo while ripening. During the process they evolve carbonic acid in darkness as well as in light, when exposed to the air or placed in an indifferent gas. The amount of oxygen evolved in air is always in excess of the oxygen taken up; this has been remarked in the case of observations extending over a long space of time. Grapes can absorb or give off water according as they are placed in a moist or dry medium. As the change goes on the acids decrease in amount, while the quantity of sugar increases. The acids and the glucose are carried to the grapes by the sap. Here the acids are slowly consumed, while the sugar increases in point of concentration, and at a still later stage the sugar itself is consumed.

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New Engineering Inventions.

Mr. Henry Bolthoff, of Central City, Col., has patented an improvement in Pulverizers for disintegrating ores and other substances; and it consists in a wheel containing several shoes, arranged at equal distances around its periphery, and arranged tangentially to a circle inscribed within the periphery of the wheel, every such series of shoes being provided with a heavy pulverizing ball that rolls along the shoes and drops from one to another as the wheel is revolved.

Mr. Martin Everhart, of Fort Worth, Texas, is the inventor of an improved Machine for Storing the Power of Wind Engines. It consists of a water power which is so constructed that the water may be stored up by the irregular action of the wind in such a way that it may be used for furnishing a continuous power.

Mr. David Horrie, of Keokuk, Iowa, has patented an improved Railroad Ditching Machine, which may be drawn forward on the railway track by the locomotive, and will rapidly form ditches at the sides of the track, and deliver the earth at the sides of the track, or at the center of the track, or to a car, by which it may be carried away.

Mr. Silas G. L. Morrow, of New Bloomfield, Mo., is the inventor of an improved Scraper for leveling roads, making excavations and other similar operations; and it consists essentially in a cart having attached to it a scraper, which is suspended and operated by levers attached to the cart.

Mr David M. Finlayson, of St. Paul, Minn., is the inventor of an improved Journal Bearing, which consists of a series of rollers surrounding the journal, and interposed between its surface and that of the inside of the bearing, the rollers being kept parallel with the journal by a pinion parallel with the axis of the journal, and gearing with the surfaces of the rollers; the pinion is mounted in bearings in the oil box underneath the journal, and acts as a lubricator to the rollers, and through them to the journal.

Mr. Benjamin F. McKinley, of Morning View, Ky., has patented an improved Hot Air Engine, in which the chamber in which the circulation of air is kept up by the displacer is made of two corrugated metal disks, and the displacer has wings which enter said corrugations to give a tortuous passage to the air and bring it into more intimate relation to the surfaces, thus securing a larger margin of difference in temperature. A special link motion controls the engine, and a new form of regenerating surfaces is employed in the regenerating chamber through which the air circulates.

Mr. William H. Plumb, of Mauch Chunk, Pa., has patented an improved Ore Jigger. The object of this invention is to improve the apparatus or jigger for separating ores from slate and other lighter products, for which letters patent were granted to the same inventor July 1, 1873. In this jigger the lighter parts are separated from the heavier parts, and discharged separately.

Mr. James H. Sparkes, of Clinton, Ill., has patented an improved Railroad Crossing. The advantages of this crossing consist in the firm and reliable connection of the joints of the castings, of their broad base that renders a rocking motion impossible, of the rounded off recesses of the flanges that dispense with separate guard rails in the crossing, and of flanges that take the place of the rails in case of injury to the same, and admit the easy and convenient repairs of the crossing by replacing worn out or broken rails.

Communications.

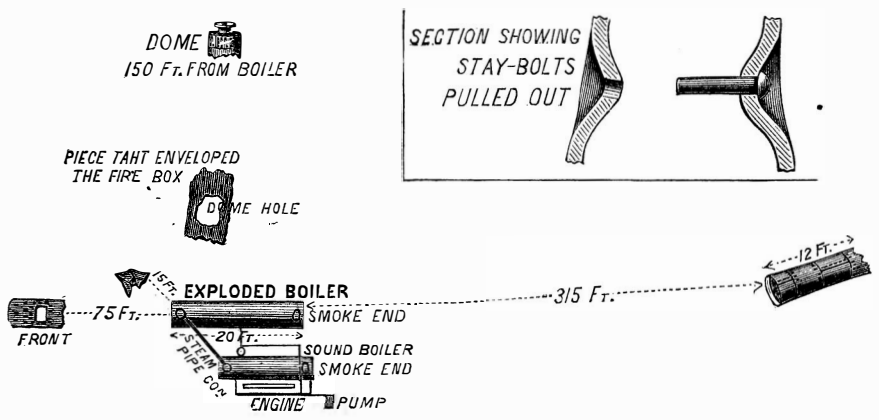
Boiler Explosion at Holland, Vt.

To the Editor of the Scientific American:

An investigation, last Saturday (22d), of the boiler explosion at Mr. Henry Pinney's mill, at Holland, Vt., on the 6th of June, revealed the following facts:

Last February a supplementary boiler was put in the mill by a man named Foley, the steaming capacity of the first boiler not being sufficient to supply the engine. This second boiler was in the form known as "locomotive." It was 20 feet long, the cylindrical portion of the shell being 32 inches in diameter, and contained thirty-four 2¼ tubes. The positions of the boilers were north and south, the fire ends being to the north. Looking to the south the second boiler was on the left hand side of the first, the engine being on the right hand side of, and on a cast iron frame with, the first boiler. The two were connected by a 1½ inch pipe, and were 4 feet apart. The connecting pipe had no cock and reached from dome to dome of either boiler. The supply of steam for the engine was taken from the first boiler by a 2½ inch pipe. Each boiler had a safety valve and steam gauge, with water gauge cocks (three to each), all in good working order. The water supply was from a pump of ample capacity through an inch pipe. This pipe entered a T coupling on the water supply pipe connecting the boilers near the bottom of each. Between the T coupling and the first boiler a globe valve was located, while a brass check valve of the globe pattern was placed close to each boiler, all being in good working order, as shown by the testimony of the engineer and others who were at work in the mill.

Fifteen or twenty minutes before the explosion the engineer had stopped the engine to get up steam, it being too low to carry all the machinery. Having gotten up a pressure of 95 lbs. by the steam gauges, which, according to the testimony, worked about alike, and which also agreed with the figures marked on the lever of the safety valve of the second boiler, the pea of the same being set within 5 lbs. of its utmost limit, namely, 95 lbs., he started the engine and ran a few minutes, when a cedar wedge in the steam chest blew out. It appears that this wedge was a temporary means of stopping a leak where a small portion of the packing had blown out. While he was in the act of doing this the second boiler exploded, throwing the cylindrical portion (which is 12 feet long and filled with the tubes) 315 feet to the south, tearing through the heavy timbers of the mill, clearing away everything in its track, and striking a pile of logs, which were scattered in every direction. The fire front was thrown 160 feet to the north, where it struck a tank

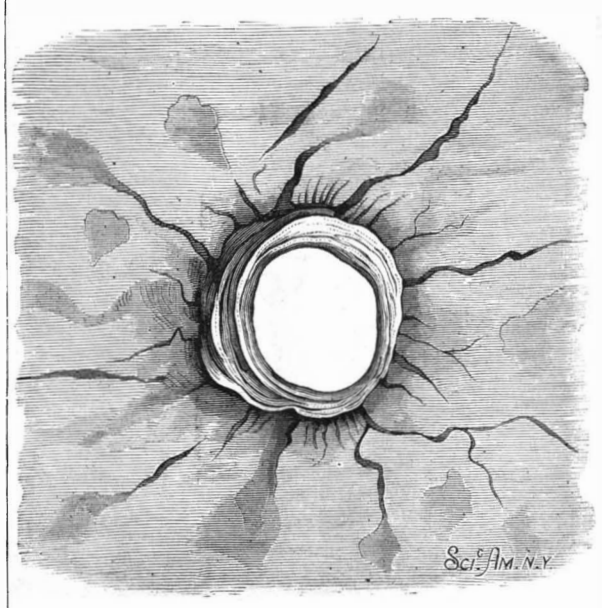


PLAN OF BOILER EXPLOSION.

with great force. The interior portion of the firebox was completely collapsed and thrown about 15 feet, while the outside of the firebox was ripped off like so much paper and landed about 60 feet to the east of the dome, being thrown 250 feet to the east, where it landed in a brook. Other but smaller portions of the boiler were thrown in various directions.

The examination was made by me. My report states that the boiler was not safe to carry over 60 lbs. had the boiler been new, the construction of the boiler being such as was intended to mislead. The edges of the plates where they lapped on the outside were wedged or hammered up to represent thicker iron, which was but $\frac{5}{32}$ of one inch thick. Imitation stay bolts were so placed as to lead one to think they secured stay rods, which was not the case. The upper tier of tubes show evidence of having been burned at some time, but not lately, as the deposit of scale bears the same appearance as that of the lower tubes. None of the tubes were collapsed.

The testimony given shows that the gauge cocks in this boiler had been tried by two persons two or three minutes before the explosion, and two good gauges of water were there. The appearance of the fire box indicates the origin



of the explosion to have been by the giving way of the stay bolts in the vertical sides, which would permit the crown sheet to drop down, at the same time liberating the lower edges of the outside sheets of the firebox, ripping off that portion, and throwing it, with the dome, to the east, while the reaction of the escaping water and steam in the shell carried it, end over end, to the south. The havoc made is not easy to describe: it is sufficient to say it was and is the personification of chaos. The examination also showed places in the boiler not one eighth of an inch thick, having been eaten by rust. Evidence was also produced by which it was proved that the crown sheet and sides of the firebox were badly bulged between the stay rivets, this being conclusive evidence that the boiler was unsafe and unfit for use before it was brought here; and it is hoped that the parties who sold it, recommending it to be safe at 140 lbs., will be made to pay damages.

There were three men and a boy in and about the mill at the time, and it is a great wonder that some of them were not killed outright. The foreman, Mr. Garrish, was knocked down by a flying piece striking his forehead and cutting a severe gash; the sawyer was simply blown out of the mill, with the chew of gum he was in the act of biting off when the explosion occurred; the engineer was knocked insensible, and he came to himself as he was crawling among the débris; and the boy was blown into a brook near by and severely scalded, not being yet out of danger. The engineer is in a fair way to recover, though being injured internally.

The report was heard from a distance of three miles, a peculiarity of this being noticed, that is, it was more distinct at a distance than close by. F. A. WISEWELL.

Beebe Plain, June 22, 1878.

[This is a fearful commentary on the too ordinary practice of buying a boiler because it is cheap, and putting it to work before it was examined or tested, with nothing, in fact, but the statement of an irresponsible dealer. Steam users who wish to avoid explosions have long since learned that they can be prevented by a system of careful and intelligent inspection.—EDS.]

Boiler Explosion at Hillsboro', O.

To the Editor of the Scientific American:

There was a boiler explosion near this place a few weeks ago, killing three persons instantly; there were some peculiar developments connected with this explosion to which I desire to call the attention of the public and the users of boilers.

The boiler that exploded was of the form known as the locomotive boiler, used to drive a circular saw-mill of about 20 horse power; had been in use about ten years; had been repaired about four years ago, when a new crown sheet was put in; previous to the explosion the boiler was considered safe and had repeatedly carried 125 lbs. of steam; at the time of exploding was carrying about 70 lbs.; showed two gauges of water, and was running; it blew up just as the sawyer was about to start the saw into the log, and had opened the steam valve for that purpose. After the explosion, the boiler was examined, and was found to be of fair to good iron at all points except around the stay bolts, and here there was a peculiar deterioration of the metal; around every one of the stay bolts the metal had shriveled up or shrunk away from the bolts until there was only a thin shell left standing, and that on the outside, so that there was nothing left to hold on to the stay bolts but this thin shell and the head of stay bolt formed by riveting; this shriveling up only occurred where the bolts were under the water line in the steam room; the iron around the bolts was in perfect condition; so also were all other parts of the boiler plate around the rivet heads, etc.; the iron around the bolts looked like iron that had been burned, and showed about the same on the outer shell as on the inner one.

In the explosion about half of the stay bolts were pulled out of inner shell and left in the outer shell, and the other half *vice versa*. The water used usually was what is known in this country as hard water impregnated with lime, but no scale of lime was shown at any point except on the flues. The initial point of giving way was on the right hand side of the fire-box; the outside shell being thrown out and upward, and finally tearing itself loose on the left hand side, being caused to do so by the giving way of the metal around the stay bolts.

Now the question is, What caused the metal around the stay bolts to shrivel up or deteriorate? Is this a common thing in boilers of this class?

Your opinion in this matter is respectfully asked.

Hillsboro', O., July 3, 1878. C. S. BELL.

[The first thought that occurs to us on reading your letter and examining the sketch (for which you are entitled to great credit) is that the boiler was weakly stayed, so that there was a constant expansion and contraction of the sheet. At all events, similar causes have before this been productive of like results.—ED.]

That Hundred and Fifty Million Dollars.

To the Editor of the Scientific American:

I see that a paragraph which has been extensively published in agricultural papers has at last found its way into the columns of the SCIENTIFIC AMERICAN, page 90. This I regret, because said paragraph represents a great deal of imagination and very little fact. Ambitious reporters are too apt to contort casual conversation, and the item above referred to was born of just such ambitious reporting. How thoroughly out of time and place the last paragraph is will appear from the fact that the appropriation of $5,000 therein mentioned was, in reality, made to the Department of Agriculture, which is now carrying on the cotton insect investigation called for. C. V. RILEY.

Washington, D. C., August 3, 1878.

Machinery as an Educator.

In his lecture on the "Reign of the Common People," Rev. Henry Ward Beecher says: "New labor, especially manufacturing industries and commercial industries, are most powerful educators; they stir up the brain; they make it nimble; they make it various; they make it fruitful, and drive men forward in the way of life."

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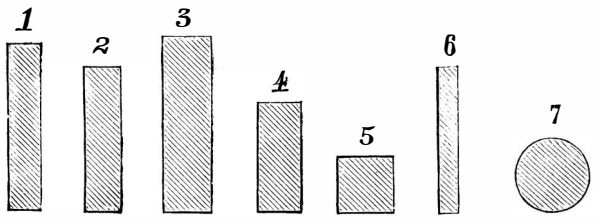
FILES AND RASPS.*

As there are features of files and rasps that are not familiar to many of our readers, we present the leading characteristics of these important tools.

Files and rasps have three distinguishing features: 1, their length, which is always measured exclusively by their tang; 2, their kind or name, which has reference to their shape or style; and 3, the cut, which has reference to the character and relative coarseness of the teeth. The length of a file bears no fixed proportion to its width or thickness.

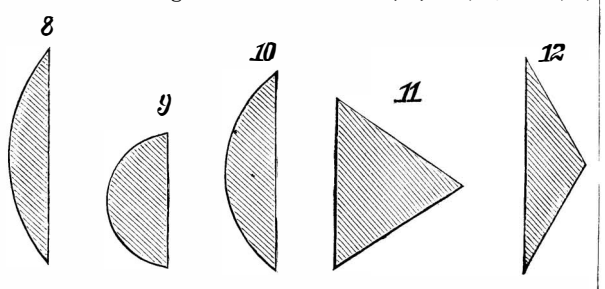
Some of the technical names by which the different shapes of files are designated are derived from their cross section, but many receive their names from the purpose for which



they are to be used; for example, mill files are for filing mill saws, pitsaw and hook tooth files are for filing saws designated as such. Other files have names of unknown origin.

To these names are added terms representing peculiar features of the file; a file that is reduced in size toward the point by a curved taper is called a taper file; files that are of a uniform size throughout their entire length are called blunt, and files having an exceedingly slight belly or curvature extending from point to tang are equaling files.

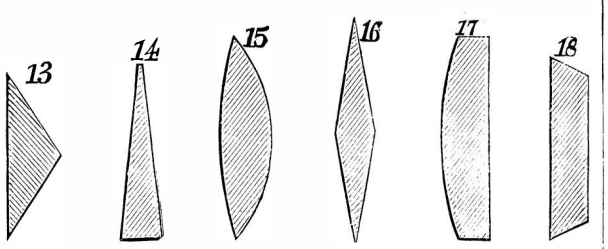
Figures 1 to 19 inclusive represent the cross sections of files showing the different forms for various purposes. Figures 1 to 6 inclusive represent files of quadrangular section. In these cuts Fig. 1 is a mill saw file; 2, flat; 3, hand; 4,



pillar; 5, square; 6, warding; 7, round; 8, cabinet; 9, pitsaw; 10, half-round; 11, three-square; 12, cant; 13, lightning; 14, knife; 15, cross; 16, feather edge; 17, shoe rasp; 18, reaper; 19, tumbler. These forms are made in various sizes.

There are three distinct forms of cut, known as single cut, double cut, and rasp, and each form of cut has degrees of coarseness, designated by the terms rough, coarse, bastard, second cut, and smooth.

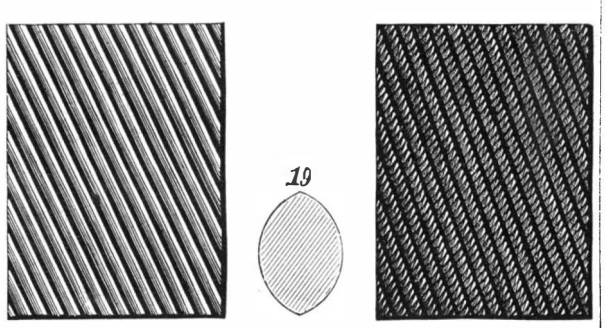
The single cut files are those which have a single course of chisel cuts across their surface, arranged parallel to each other and extending diagonally across the face of the file.



A portion of the face of a coarse single cut file is shown in figure 20.

Single cut files of the coarser grades are sometimes called floats.

Files having two courses of chisel cuts crossing each other are called double cut. This form is shown in figure 21. The first course is called the over-cut, and the second, which crosses the first, is called the up-cut. These two courses fill the surface of the file with teeth inclining toward the point, which resemble when magnified the diamond shaped cutting



tools in general use. Double cut files are of more general use than other forms. The engraving shows the coarse cut.

Rasps differ from single or double cut files as their teeth are disconnected and made in a peculiar form by a single pointed tool, called a punch. The teeth thus formed are arranged so as to produce the smoothest possible work consistent with the number of teeth in the surface of the rasp.

* From a "Treatise on Files and Rasps," published by the Nicholson File Company, Providence, R. I.

Rasps used by horse-shoers have coarse teeth, as shown in figure 22; those used by carriage-makers and wheelwrights have the bastard cut. Shoe rasps are second cut, and smooth rasps are used by cabinet makers.

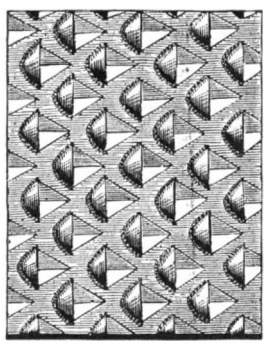


Fig. 22.—RASP.

It was not until a comparatively recent period that files were successfully cut by machinery. The first account we have of any attempt in this direction is of an invention by Duverger in 1699. Several attempts were made during the eighteenth century. In 1800 a Frenchman named Raoul invented a machine, and commenced to produce watch-makers' files which were spoken of, years ago, as being beautiful specimens of workmanship, and less liable to clog and pin than hand cut files.

The beautiful, small Swiss and French files for dentists,

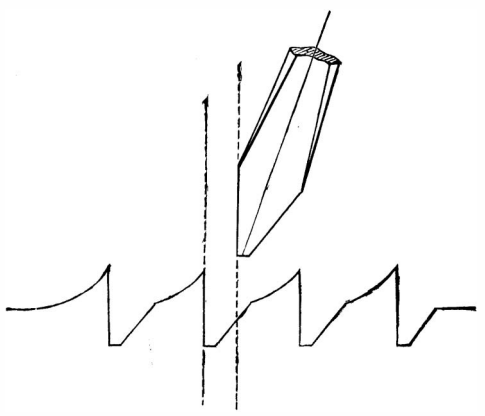


Fig. 24.

watch-makers, and similar uses, now sold in this country, are said to be made by machinery.

The difficulty attending the introduction of machinery in cutting the larger files in general use was not practically surmounted until within the past fifteen or twenty years. Now, however, much the larger proportion of files made and used in this country are machine cut.

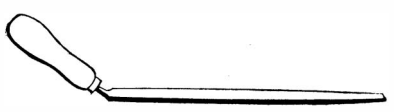


Fig. 27.

Cutting files by machinery has arrived at such perfection that there are no peculiarities in the formation or shape of the tooth of a file as made by hand that cannot be made by machinery.

A mistaken idea prevails with some that a good tooth can only be produced by hand and with a chisel which is ground to a sharp knife edge, as represented in figure 23; but this is not the case, as it is not the bottom but a very small fraction of the top of the tooth that does the cutting, and if a proper shape be given to the top of the tooth, its base and the bottom of the cut should be made with a special view to prevent pinning. One of the principal causes is found in the extreme acuteness of the chisel cut at the bottom, which permits the filings to become so firmly wedged as to require considerable labor in removing them.

The proper form of tooth, which is shown in figure 24, is produced by a chisel of peculiar form shown in the same figure. This chisel is driven straight down into the steel blank by the cutting machine, and it throws up a tooth and forms a space of the most advantageous shape. In addition to the shapes already described, there are rifflers (one of which is shown in figure 25), which are simply files of the various kinds bent to adapt them to peculiar work. Rifflers are

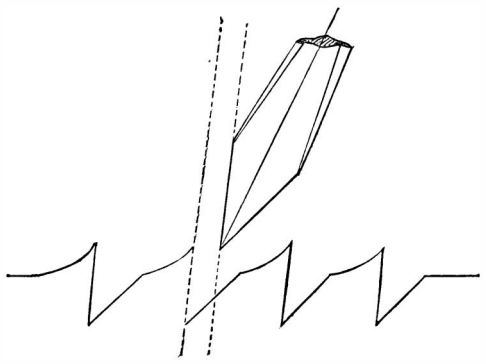


Fig. 23.

used principally by carvers in wood, metals, marble and stone; also, in shaping and finishing in and about the many irregular places in pattern work.

Stubs or short files are very useful and economical in finishing in and around depressions where an ordinary file could not be used. A stub, and holder adapted to it, is shown in figure 26.

In filing large flat surfaces the tang is frequently bent as shown in figure 27. Sometimes a curved holder (Fig. 28) is employed. The surface file holder shown in figure 29, and the vise file holder shown in perspective and side elevation in figure 30, are employed in holding files for surface work. By means of these devices files may be sprung so as to give more or less convexity to their working faces.

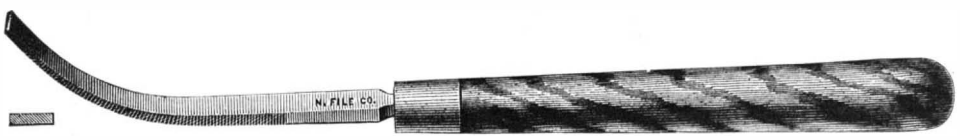


Fig. 25.—RIFFLER.

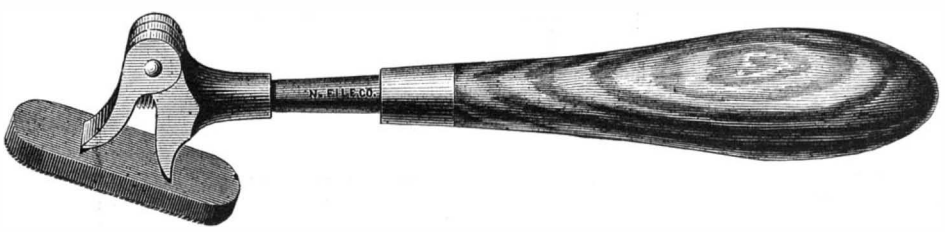


Fig 26.—STUB AND HOLDER.

In economizing the wear of files intended for general purposes, consideration should be given to the kind of material to which they are applied in the different stages of use.

The first wear of these files should be in finishing the lar-

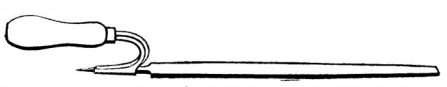


Fig. 28.

ger surfaces of cast iron, bronze, or brass, all of which require a keen cutting tooth; they may after such use be made to do good execution upon narrower surfaces of these metals, also upon wrought iron and soft steel; although the file best suited for general purposes is not so well adapted to the filing of brass or other similar soft metal as those files having teeth which are specially designed for this purpose.

Fig. 29.—SURFACE AND FILE HOLDER.

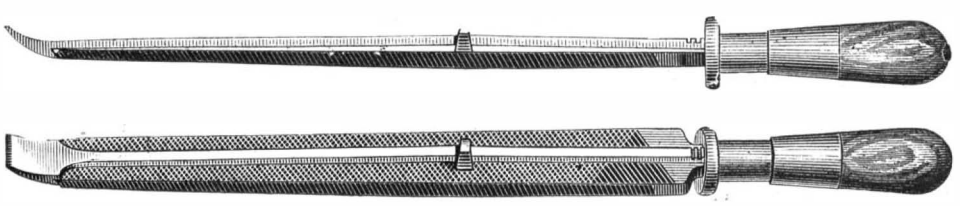


Fig. 30.—VISE FILE HOLDER.

Scale, sand, and chilled edges should be removed from castings by pickling and grinding before applying a file. A

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file should be entirely free from oil when it is applied to smooth glassy surfaces, but when it is used on narrow pieces of fibrous metal oil may be applied to advantage. Good workmen often fill the teeth with oil and chalk, thus lessening the disposition of the file to "pin."

One of the most destructive customs among a large number of mechanics is that of loosely throwing their files, fine and coarse, small and large, into a drawer filled with cold chisels, hammers, turning tools, etc., and then throwing chisels, hammers and other tools on the files.

When we consider the small portion of the points of the teeth that is worn off by use; and that to effectually dull them for some kinds of work requires but the slightest rubbing upon a hard substance, it will be admitted that the evils of this habit should be more carefully considered.

Rosin and Beer.

The veteran temperance leader, Neal Dow, favors us with a communication in which the serious physiological results attending the use of beer containing rosin are dwelt upon at considerable length. Mr. Dow neglects, however, to offer any evidence to show that brewers ever use rosin in the manufacture of beer. It may be that Mr. Dow, like many others, labors under the erroneous impression that every article embraced in brewers' supplies is somehow made an ingredient of beer. Only the other day an apparently intelligent gentleman endeavored to convince us that brewers put oil of vitriol into beer. He knew they did, for he had seen carboys of the acid set down at the brewer's door. The observation was correct, but the inference was wild, the acid being used simply in cleaning the brewer's coppers. So with rosin. Because it is largely employed by brewers, it by no means follows that it goes into beer. It is used for coating the insides of beer barrels to prevent the escape of the gas or "life" of the beer, a purpose for which it would be worthless were it not insoluble in beer.

A SIMPLE PHONOGRAPH.

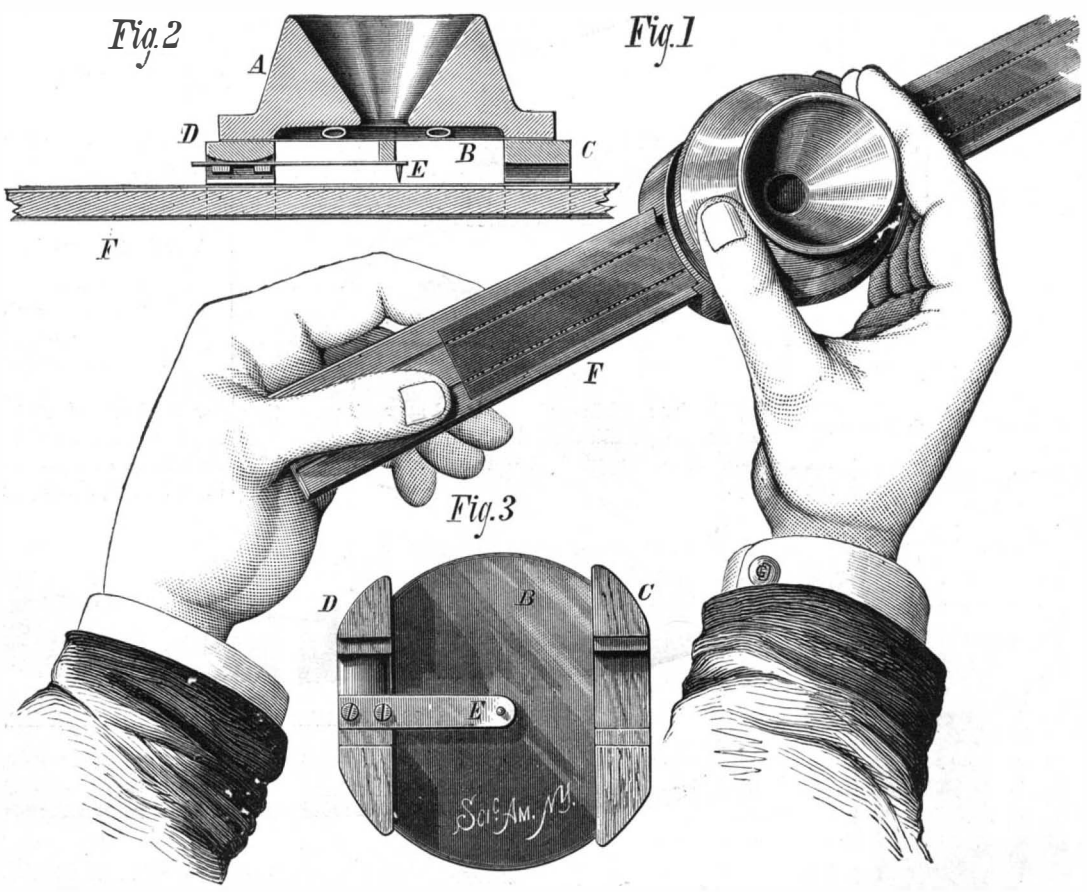
This simple instrument, which is shown in perspective in Fig. 1, in section in Fig. 2, and in plan in Fig. 3, consists of a mouthpiece, A, to which is attached a thin ferrotype plate diaphragm, B, by means of a good quality of sealing wax or cement.

Upon the outer face of the diaphragm and at opposite edges there are guides, C D, for receiving the wooden strip, F. These guides present only a slight bearing surface to the strip. The guide, D, is rounded to receive the spring, E, which is secured to it by two screws, by which also the spring is adjusted so as to bear with more or less force on the small rubber block which rests upon the center of the diaphragm.

A needle, which is sharpened like a leather sewing needle or awl, is soldered to the spring, and is located directly opposite the center of the diaphragm. The guides, C D, are placed so that the median line of the strip, F, is at one side of the needle. The strip, F, has four slight longitudinal grooves, two on each side, which are made with an ordinary carpenter's gauge. These grooves are located so that when the strip is moved through the guides, one or the other of them will pass over the needle. A piece of beeswax is rubbed over the sides of the strip to give it an adhesive coating for receiving the foil used in recording the sounds.

The foil, which should be rather heavy, must be cut into strips wide enough to extend beyond the grooves in the wooden strip. The foil is laid on the wooden strip and burnished down with the thumb nail, so that it will adhere. The strip thus prepared is placed in the guides, C D, and the needle is adjusted so that it indents the foil slightly as the stick is moved along.

By talking in the mouthpiece and at the same time moving the strip along with a smooth steady motion, the sounds are recorded on the foil. By passing the strip again through the guides, so that the needle traverses the same groove, and applying to the mouthpiece a paper funnel or resonator, the sounds or words spoken into the instrument will be reproduced. It is even possible to record the sounds on a plain strip of wood so that they may be reproduced. The engraving is about two thirds the actual size of the instrument.



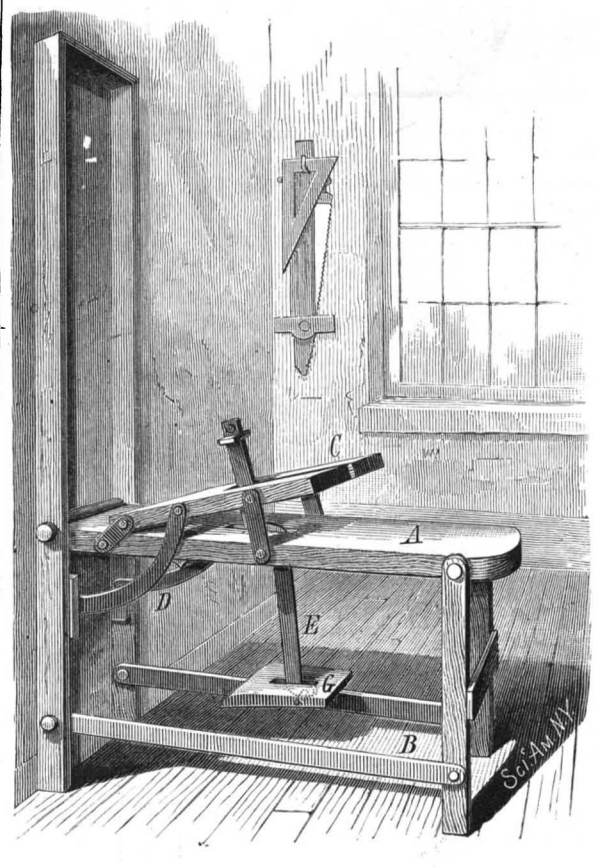
A SIMPLE PHONOGRAPH.

Restoration of Faded Handwriting.

Von Bibra reports (*Jour. Pract. Chem.*) that a moderately concentrated aqueous solution of tannin (gallo-tannic acid) will render legible writing which has faded through age, with none of the destructive effects on the paper occasioned by the use of hydro-sulphate of ammonia. He applies the tannin solution with a brush, removes the excess by a current of water, and dries the document at a temperature of 50°–60° R. The writing developed in this manner remains clear and black after the lapse of several months. Of course only manuscripts written with ordinary ink can be restored in this way.

FOLDING SHAVING HORSE.

We give herewith an engraving of a novel folding shaving horse, the invention of Mr. Samuel E. Cress, of Hillsborough, Ill.



FOLDING SHAVING HORSE.

This horse is designed for the use of coopers and others who require a convenient device for holding work while it is shaved.

The bench, A, is pivoted at one end between vertical studs, and has at the other end two legs that are connected with the vertical studs by rods, B. An inclined work support, C, is connected with the bench by two straps at each side; it is also connected with one of the vertical studs by a curved bar, D, which serves to move the support, C, into a working position when the bench is let down, and it brings the support into a position parallel with the bench when the latter is folded up.

The clamping lever, E, is bent twice at right angles upon opposite sides of its pivot, and the work support, C, is slotted, so that when the bench is folded up the upper end of the lever lies in contact with the upper face of the bench, and its lower end rests against the lower surface of the bench. The lower end of the lever, E, is bent at a right angle, and to it the foot board, G, is pivoted.

All of the parts of the horse may be folded up between the two vertical studs, so that the floor may be used for other purposes when the horse is not in use.

This invention was patented through the Scientific American Patent Agency July 16, 1878. For further particulars address the inventor as above.

Little Mothers.

The little world of petite humanity has been sorely tried of late in the pathetic death of Minnie Warren and the scarcely less pathetic saving of Fannie Burdette through the sacrifice of her child. Had the first been properly treated her life also might have been saved; but her physician would not destroy the child without the mother's consent, and that could not be obtained until it was too late. It will be remembered that Minnie was married some years ago to "Major" Newell, better known as "General Grant, Jr.," at the same time that her diminutive sister Lavinia was married to General Tom Thumb. The latter pair have had one child, which died in its third year. Fannie Burdette, or, more correctly, Mrs. W. H. Bristol, is perhaps the smallest of living mothers, her height being only 2 feet 8 inches, and her weight 50 pounds. She has been married two years and has lost one other child, stillborn. Her husband, formerly doorkeeper to the circus with which Mrs. B. traveled, is of full size.

New Agricultural Inventions.

Messrs. Robert B. Wright and Parvin Wright, of Rock Creek, Wyoming Ter., are the inventors of an improved Hay Rake and Baling Press, which is so constructed as to collect the hay and press it into bales while the machine is being drawn forward through the meadow.

Mr. Richard N. B. Kirkham of Kansas, Ill., has patented an improved Horse Hay Fork, which is constructed so that it may be easily thrust into the hay and will hold a load securely.

Messrs. James H. Barley and Thomas K. Barley, of Sedalia, Mo., have patented an improved Fastening for securing Harrow Teeth to the side of the bars of a harrow frame, in such a way that the teeth may be held in a vertical, inclined, or horizontal position parallel with the bars.

An improved Seed Planter has been patented by Arnold J. West, of West's Mills, Mich. This invention consists essentially in a series of rotating arms carrying pivoted buckets that lift the seed in suitable quantities and at proper intervals, and deliver it to the hollow drill teeth. The machine is provided with markers or stampers of novel construction, which press the earth on the planted seed and at the same time produce a distinct mark, which indicates the location of the hill.

An improved Corn Dropper has been patented by Mr. Hiram H. Hartsock, of Clear Creek, Ill. The marker arms carry at opposite ends adjustable feet or markers, having sleeves for receiving the marker arms and set screws for clamping them in any desired position, the object being to adapt the marker to different kinds of soil. The markers and the dropper cam are attached to the same shaft, so that they will always bear the same relation to each other, and must therefore be accurate.

Mr. Thomas Delany, of Geneva, N. Y., has patented an improved Strawberry Protector, which consists of a saucer for protecting strawberries and other small fruits against being covered with sand and dirt. The saucer will also accelerate the growth of the plants and berries by shedding the water to the roots, and concentrating the rays of the sun immediately upon or about them.

Mr. William A. Woodward, of North Tunbridge, Vt., has patented an improved Draught Adjuster for Plows, intended to be used in land containing stumps or large stones. The object is to enable the plowman to avoid said stumps or stones by shifting the draught to either side of the beam instead of lifting the heavy plow by muscular power.

Mr. Theophilus Harrison, of Belleville, Ill., has patented an improved Thrashing Machine Frame, which is so constructed that it may be turned in a very small space and readily arranged or set in the desired position for use.

Mr. Homer T. Rector, of Clinton, Mich., has patented an improved Attachment for Plows for use in keeping them clear of stubble, stalks, weeds, grass, and other rubbish, without having to stop the team to clear the plows of the said rubbish.

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Silkworm Breeding.

BY PROFESSOR CHAS. V. RILEY.

The possibility of producing two annual yields of raw silk, which you refer to in your issue of August 10th, cannot be considered a discovery, and will certainly create no change in the production of silk. In all silk growing countries, races of worms that are single, double, or treble brooded, that is, which produce one, two, or three generations annually, have been known for centuries. In France they are termed respectively *annuel*, *bivoltin*, and *trévoltin*. As a rule the eggs of the annuals cannot be made to hatch the same season they are laid, no matter how manipulated; but occasionally an exceptional batch will hatch, and by changed conditions any race may, in a few years, be rendered inconstant and variable. Quite a number of a white annual race, which had bred constant for seven years under my care, produced last summer a second generation; while some eggs of the same race, that had been attached to some woodwork of an apartment that was subsequently kept warm throughout the winter, did not hatch till the leaves began to unfold the next spring. Of the eggs obtained from the progeny of the second generation above mentioned, but about five per cent hatched this summer—the rest failing to hatch though exposed to the full heat of the past month—an interesting case of atavism or reversion to the more normal habit of the race. While some of the digoneutic races are reared at Milan and other places where the summers are pretty equable, they have not been found as profitable as the annuals, the summer generations proving less healthy and productive than the annuals reared in spring. What is true in this respect for Europe and Asia is fully as true for America. At the Department of Agriculture the present year there has been a good illustration in point. A number of worms of different races were fed on various species of *Morus* and a large number on *Maclura*. The worms were very much crowded and not as thoroughly cared for as they should have been. Yet, all things considered, they did remarkably well. A small lot of a digoneutic race were hatched later, and though receiving the greatest care, with plenty of room, one half of them perished ere spinning, and the rest formed small and very slight cocoons. The heat of July is too great for their well-being.

Washington, D. C., August 3, 1878.

WOOD'S LAP RING.

The engraving represents a new form of lap ring, which is made without pivotal connections. When it is in use it is securely locked, so that the parts cannot become accidentally disconnected.

The sections, A A, are both exactly alike, both being cast from the same pattern. Each section is open at the center at one side, and the opening converges toward the outer side of the ring. Tongues, B, are formed on ends of each section, which are fitted in grooves, C, in the raised solid center portion, D, of the other section.

Fig. 1

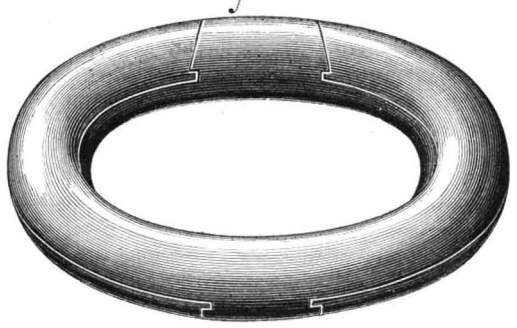


Fig. 2

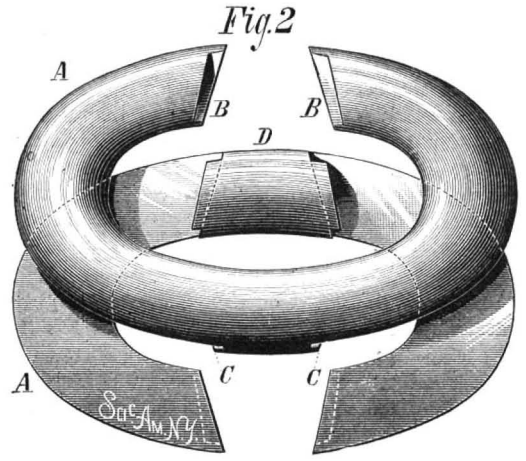
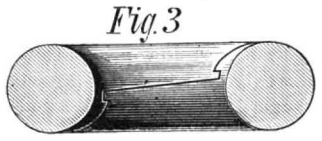


Fig. 3



WOOD'S LAP RING.

The sections of the lap ring are readily connected by sliding one of them over the other until the solid middle portion of each section enters the opening in the other section. This ring is very easily applied to chains or tackling, and forms a reliable connection, which may be easily disconnected without the use of tools of any sort.

Patented through the Scientific American Patent Agency, May 28, 1878, by Mr. Henry S. Wood, of Rob Roy, Ark., from whom further particulars may be obtained.

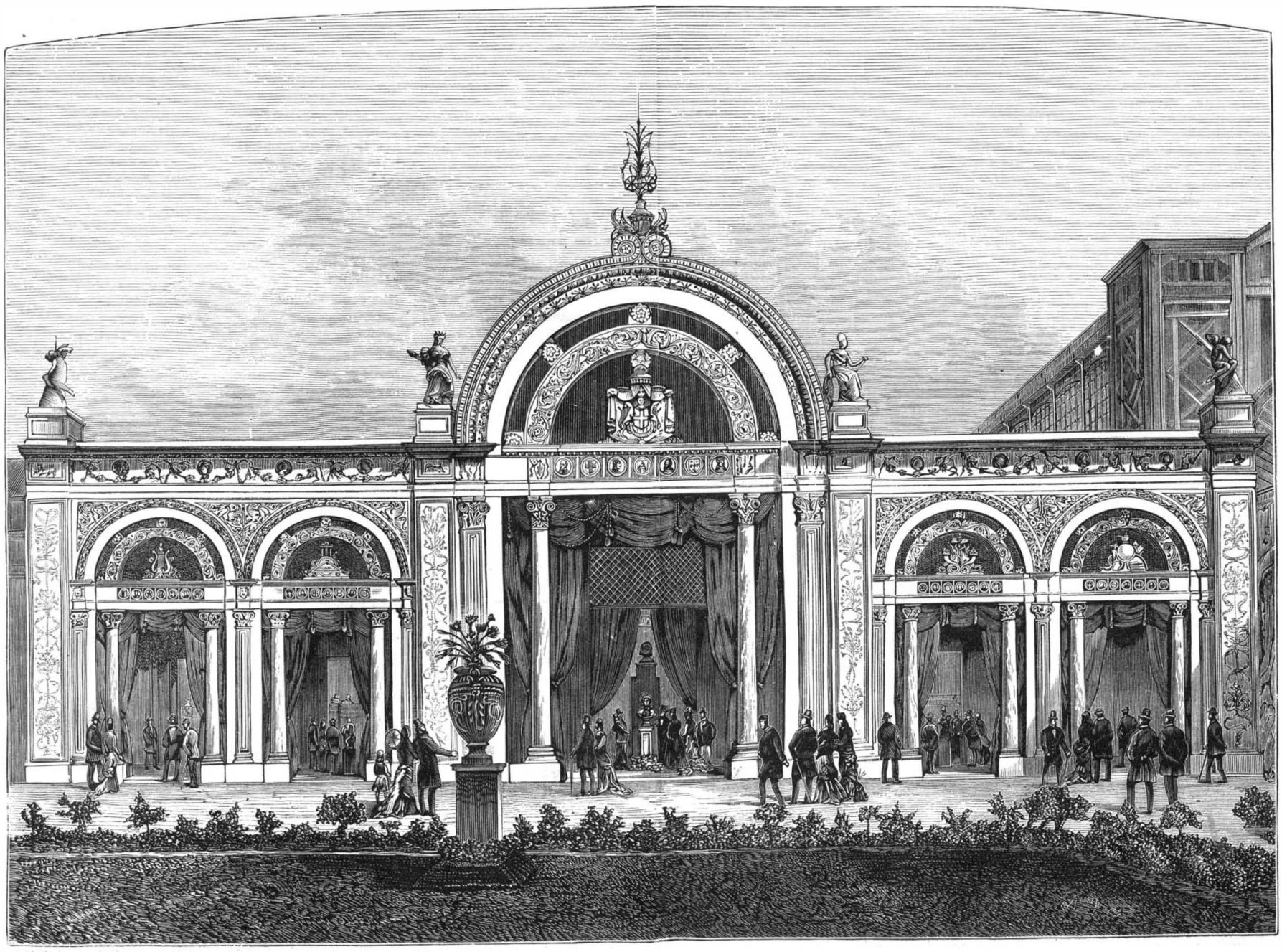
PARIS EXHIBITION.—THE ITALIAN FACADE.

The Italian façade presents a series of five arches, the central arch being nearly twice the height and width of the other four arches, the whole length of this façade being 32 meters, or 104 feet. The central arch is twofold, that is to say, with two concentric arches in the archway, which rises to the height of 30 feet. The arches are constructed of white marble and terra cotta intermixed; their span is traversed, in each opening, by a horizontal piece of marble, in which are inserted mosaics representing the portraits of illustrious Italians, poets, artists, and historians, the arms of Italian cities, and other subjects; other decorations, in black and white, are introduced above or at the sides. The central arch is supported by terra cotta pilasters and two pillars of stucco colored green to imitate cipollino marble. Heavy red curtains are suspended within the arches, and a few statues are placed there. We take our illustration from the London *News*.

Hardy Catalpa Trees.

A correspondent inquires what we know about "the hardy catalpa." There is but one species of catalpa that we know of. Some have believed they have a variety that blooms a little earlier than the other, and this may be; it is also said that one variety grows straighter than the other. We can only say there are trees in Pennsylvania, four and five feet round, that have endured winters when the thermometer indicated 20 below zero, and are as straight as gun barrels. We do not know in what respects the "hardy" and "straight" catalpa is hardier or straighter than these, and should be glad to know.

There is one point worth noting. In some situations the catalpa, in common with the pawlownia, chestnut, and other trees, dies back the first year, and often the second; or if not dying right down, loses its terminal bud, and this makes the stem a little crooked. If we were growing catalpa for timber we should let it grow as it will for two or three years, and then cut clean to the ground, a clear straight sprout, ten, fifteen, or even twenty feet high, being the result; and it goes on without dying back after. We have seen catalpa that made a sprout fifteen feet high and ten inches round, in one season, when cut back in this way.—*Gardener's Monthly.*



PARIS EXHIBITION.—THE ITALIAN FACADE, CHAMP DE MARS.

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Natural History Notes.

Foliation and Defoliation of Plants.—"Foliation" is the starting forth of leaves, and "defoliation" their natural falling off. "Exfoliation" should properly mean their artificial stripping off, but in English the word has a different signification· the French, however, have a word to express this, derived from the same roots—"effeuillaison." M. De Candolle has undertaken to examine, from certain known data, as well as from observation and experiment, whether there exists any relation between these three facts or phenomena. The following are his conclusions:

1st. On comparing a large number of ligneous species with caducous leaves, no direct and regular ratio can be discovered between the time of foliation and defoliation.

2d. In species where the phenomena of foliation and defoliation sensibly differ between individual and individual, in the same locality and under the same influences, it is sometimes found that the earliest individuals (lindens, for example) in spring are the latest in autumn; but in other species (chestnut and elm, for instance), there is no regular and habitual ratio between these two phenomena: from which it must be concluded that, in spite of exterior resemblance, the interior organization of the leaf is not identical in the individuals of these species.

3d. When one individual differs from others of the same species as regards the time of foliation, this peculiarity shows itself constantly from year to year.

4th. The total stripping (*effeuillaison*) of a ligneous plant in autumn retards the subsequent evolution of the leaves in the spring.

5th. The stripping of a branch in autumn may, or may not, produce the same effect, according to the species or by reason of other circumstances as yet unknown.

6th. The persistence until spring of the dried leaves on certain beech trees agrees with the retardation of the subsequent leafing.

Moulting of the Bill in the Puffin.—The current number of the *Zoologist* contains an interesting notice of a remarkable discovery made by Dr. Bureau in regard to the moulting of the bill and palpebral appendages in the Common Puffin (*Mormon arctica*). These birds, which are confined to the Arctic regions, on the coasts of America and Europe, assemble in spring for reproduction. They are then all of the same plumage, and wear the same adornments. The cheeks are of a grayish white; the beak elevated, and thick on a level with the nostrils; a plait at the base of the upper mandible; the lower mandible curved regularly; the eyelids vermilion, adorned with two horny plates; a large rosette of a bright yellow at the gape. By the middle of July the young are fledged, and at the middle of August the puffins are out at sea, and not a bird is to be seen on the rocks which up to this time were so full of life. Soon the winds of winter begin to blow, and after some fearful gales hundreds of the dead and dying birds are brought ashore by the waves. The puffins thus cast ashore on the French coast in winter are clad in a plumage different from that worn in the breeding season. In the orbital region they have a spot more or less large, of a dusky brown; they have not the red eyelids, nor the horny plates above and below the eye, nor have they the puckered yellow skin at the base of the bill; and what is still more remarkable, the bill is differently formed; it is neither of the same size, shape, nor color, and the pieces of which it is composed are not even the same. It is small, sliced off in front, wanting the plait at the base, and flattened laterally on a level with the nostrils, where a solid horny skin of a bright lead-color is replaced by a soft grayish membrane. Hitherto authors have considered the puffins found in this state to be the young, of different ages, of *Mormon arctica;* and indeed it has been proposed to separate them specifically under the name of *Mormon grabæ*. However, the discoveries of Dr. Bureau have shown that neither of these views can be admitted. He had for some time been convinced that these different appearances were due to a metamorphosis, and on July 1st, 1877, a specimen was sent him, undergoing the process, thus confirming his suspicions. He lost no time in visiting the breeding places of the birds, at the Ile de l'Océan, where he found them in great abundance. Almost all the specimens shot were in full metamorphosis, changing under his very eyes to what some authors have considered the young of *Mormon arctica* and others the adult of *Mormon grabæ*.

The *Zoologist* reproduces Dr. Bureau's colored plate, where by means of movable pieces the complex phenomenon of this bill moulting is shown. The author observes that the adult bird owes its summer dress to phenomena of three kinds—hypertrophy, formation of horn, and coloration; and loses it under the influence of three inverse phenomena, namely, atrophy, loss of horny substance, and loss of color. He concludes by showing that analogous phenomena occur in the allied species of this bird.

Comet Forms of Star Fishes.—In a recent number of the *Zeitsch. wiss. Zool.*, Haeckel draws attention to these forms, and the support which the facts recently established as to the power possessed by certain star fishes of multiplying by throwing off their arms, lends to his theory of the origin of the *Echinoderma* by the continually increasing integration or centralization of a radially-connected colony of worm-like individuals. The phenomenon of self-division across the disk has been observed by Lütken and Konalewsky; the production of "comet-form" depends, however, on the separation of single arms, which then reproduce the whole disk and remaining arms by budding. Martens, in 1866, observed this in the case of a *Luidia* in the Red Sea. Konalewsky found it was a common process with similar species in the same locality. Sars observed it in *Brisinga*. Huder has described the regular occurrence in *Labidiaster* of a spontaneous casting off of the arms, but not the regeneration of the disk and arms on the separated arms. Sir John Dalyell observed the whole process of reproduction of the disk on a single detached arm of an *Asteracanthion*.

The Original of the Cultivated Potato.—A potato plant (*Solanum Fendleri*) growing in great abundance in northern New Mexico is supposed to be the original of our cultivated potato. This native plant forms one of the chief articles of diet of the Navajo Indians. The squaws dig up the small tubers with whatever implements they can obtain, often using a strong, smooth piece of wood with a wedge-shaped end. The plant grows on low, rich spots, and by spring the earth is turned up in every conceivable direction in the search for the potatoes. The latter are from one-half to three quarters of an inch in diameter, and of good flavor—tasting somewhat like boiled chestnuts. The Navajo Indians consume such large quantities at a time as to cause griping pains, and as a remedy take at the same meal a quantity of earthy matter containing magnesia, which relieves the stomach. Some years ago a quantity of the tubers of this species of potato were received and distributed by the Department of Agriculture. Reports from various localities stated that, in many cases, these improved under cultivation, and increased largely in size.

Labor and Wages in Bordeaux.

According to the report of United States Consul Gerrish, Bordeaux, with 150 workingmen's societies, has thus far been exempt from strikes, or other reckless action, by any class of laboring men. They are more patient, orderly, and prudent than the workingmen in other parts of Europe. Bordeaux suffers from an unusual number of cafés—nurseries of idleness, but not of drunkenness. Light wines and beer are the common beverages. Although rum, gin, and brandy are to be had at low prices, they are rarely used. Saving societies exist to some extent among the laborers, encouraged, in some instances, by wise and benevolent capitalists.

Farm laborers are frequently so economical as to become quite wealthy proprietors. They are paid 380 to 420 francs a year, lodged and boarded; if not boarded, but are lodged, they receive as high as 800 to 850 francs per annum. Day laborers, without board, receive 2½ to 3 francs a day, with a bottle of wine. A suit of clothes costs 15 to 20 francs. Coopers, ship carpenters, and foremen in wine cellars, by great frugality, attain a condition of comparative independence. The average wages of mechanics may be stated at 4 to 4½ francs per day—an increase of nearly 1 franc since 1873. The cost of living has not increased, but rather decreased. In 1875 the decrease was notable in bread, meat, and potatoes. A government cigar factory was established here in 1816. It employs 150 men and 1,400 women. The men earn about 5 francs and the women 2 francs a day.

The value of the tobacco used is 15,000,000 francs annually, much of which is imported directly from the United States. Over 700 cooper shops exist in the district, employing more than 4,000 men. The number of casks made annually is 1,200,000, and their value 17,000,000 francs. The staves come principally from the borders of the Baltic and the Adriatic. A few come from the United States. More would be imported if they were not so bunglingly made. It is alleged that it takes a third longer to prepare an American stave than it does one from the Adriatic. They should be split, not sawed. About 15,000,000 bottles are made annually in the city by seven factories, employing 700 workingmen, who are paid by the 100 bottles, and who earn as high as 12 francs per day, according to their skill. Four factories, with 300 men earning from 3 to 6 francs per day, make 3,400,000 white glass preserve jars and perfumery bottles. At least one third as many more are imported. Only a fraction of the number of corks used in Bordeaux are made there, say 10,000,000. Cork cutters receive 2 to 2½ francs per 1,000. 100,000,000 of corks are imported. More than 1,200 persons are engaged in the manufacture of *liqueurs* and *confitures*. In the autumn, double the number are employed. Men earn from 3 to 4 francs per day, and women about half as much. The annual value of these products is 10,000,000 francs.

A Contrast.

One strictly American idea—the elevated street railway—is not likely to be adopted in any city of Europe. Foreigners are lost in amazement as they read of the inroads made by the elevated lines in New York on the property, the comfort, and all the rights of the people. They cannot understand how and why we tolerate such trespassers. In London, where rapid transit is in operation to an extent elsewhere unknown, the elevated road, of the pattern with which we are too familiar, would cause a riot if not a revolution. The Englishman, with his lofty notions of individual rights, would not stand it a moment. No British capitalist or speculator is bold enough to start such a scheme at home. They come for it to New York, where the people are so used to misgovernment and railway usurpation that they have almost ceased to resist.

We hear much from the great stockholders of the elevated lines about the discomfort and many inconveniences of traveling on the London underground lines. To these interested statements the best answer is the steadily increasing patronage of those lines. In order to meet the public demand new routes and connections have been planned in London—all underground. Even less of a habitual growler than John Bull could find some objections—though mostly trivial—to this class of railways. It may be freely admitted that, for the passengers alone, traveling underground, though in the best ventilated tunnels and the most perfectly lighted cars, is no pleasanter than a trip on an elevated road. Safer it undoubtedly is. But the comfort and pleasure of passengers are not the only things to be consulted. And there is just where Englishmen and Americans are taking different views of rapid transit. In London everything is not sacrificed to the passengers. The people dwelling along the route are taken into account also. The roads are built underground (as a first reason) because they would there cause the least possible annoyance to the inhabitants of the streets whose crowded traffic they were designed to relieve. In this city rapid transit has been handled wrong end foremost; the passengers and the money the jobbers can collect from them are considered first, last, and always, and the property owners and lessees along the lines are nowhere.—*New York Journal of Commerce.*

ASTRONOMICAL NOTES.

BY BERLIN H. WRIGHT.

PENN YAN, N. Y., Saturday, August 24, 1878.

The following calculations are adapted to the latitude of New York city, and are expressed in true or clock time, being for the date given in the caption when not otherwise stated.

PLANETS.

	H.M.		H.M.
Venus rises	3 10 mo.	Saturn in meridian	2 00 mo.
Jupiter in meridian	9 51 eve.	Neptune rises	9 32 eve.
Saturn rises	8 02 eve.		

FIRST MAGNITUDE STARS, ETC.

	H.M.		H.M.
Alpheratz rises	5 59 eve.	Procyon rises	3 04 mo.
Algol (var.) rises	7 39 eve.	Regulus	invisible.
7 stars (Pleiades) rise	9 58 eve.	Spica sets	8 29 eve.
Aldebaran rises	11 18 eve.	Arcturus sets	11 09 eve.
Capella rises	8 45 eve.	Antares sets	10 29 eve.
Rigel rises	1 28 mo.	Vega in meridian	8 20 eve.
Betelgeuse rises	1 13 mo.	Altair in meridian	9 32 eve.
Sirius rises	3 29 mo.	Deneb in meridian	10 24 eve.
Mira (var.) rises	10 12 eve.	Fomalhaut rises	8 39 eve.

REMARKS.

Venus, Jupiter, and Saturn are the only planets now visible to the naked eye; Mercury, Mars, and Uranus passing the meridian nearly at noon. Venus and the moon will be in conjunction August 26, 4h. 4m. mo. When they are nearest, Venus will be close upon the moon's southern limb, and both bodies will be exactly one hour high. Mira Ceti, the "wonderful star of 1596," began to increase in brilliancy August 18, and will continue growing brighter until October 1, when it will probably be about 2·9 magnitude, remaining thus for fifteen days. Its maximum brilliancy is thought to vary from 1·5 to 5·0. It will be interesting to follow this variable through its changes.

The Arabian Cure for Hydrophobia.

Les Mondes states that M. Reiche has recently addressed a communication to the Entomological Society of France on a subject of practical entomology of so interesting a nature that it deserves to be made known.

M. Reiche says that his colleague, M. De Saulcy, sent him some fragments of beetles that he had received from Cabes, in Tunis. In regard to these his correspondent, M. Chevarrier, writes him as follows:

"I send you herewith the remedy of the Arabs against hydrophobia. It consists of specimens of two species of scarabs given to me at the south of Ouderna by a man of the tribe of the Amernas; he has a dozen of them, which he preserves as something very precious. In presenting them to me he detailed their virtues and explained the manner in which they are used. On my return to Cabes I spoke of this remedy to a very intelligent Arab, who assured me that all the statements of his countryman were true, and that these beetles were recorded in their medical works, where may be read that the *Dernona* (the insect) cures hydrophobia if administered within twenty days after a person has been bitten. The dose is a piece the size of a grain of wheat, to be given to the patient in a bit of meat.

"These insects possess powerful vesicating properties, judging from what the Arabs told me, and it would endanger the patient's life to increase the dose too much. The Arabs are unanimous in affirming the efficacy of this remedy, which will act, however, only during the eighteen or twenty days subsequent to the biting. It scarcely admits of a doubt that the remedy occasions dreadful attacks of colic, and, being extremely powerful, should be administered only with the greatest prudence."

M. Reiche states that the fragments which were sent him are those of coleoptera of the species *Meloë tuccius* and *Mylabris tenebrosa*, belonging to the family of blistering beetles, and well known as powerful vesicants. Their congeners are common in France (and America), and it would be well to try a modification of the remedy by using for this purpose, say, the common Spanish fly (*Cantharis vesicatoria*).

It is possible that the terrible though happily rare affection, hydrophobia, might be averted by the internal use of vesicants, which, according to the facts given, would seem to be capable of destroying or neutralizing the virus of the disease. It should be remarked that the use of *Meloë* (especially *M. proscarabæus*) as an antidote to hydrophobia was long ago recommended, and that M. Fermaire communicated to the society in 1856 a pamphlet by Saint-Hombourg treating of this very subject.

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Reciprocity in Trade Marks between Great Britain and the United States.

President Hayes has issued a proclamation, under date of July 30, 1878, to the effect that the Government of the United States of America and the Government of Her Majesty the Queen of the United Kingdom of Great Britain and Ireland, with a view to the reciprocal protection of the marks of manufacture and trade in the two countries, have agreed as follows:

"The subjects or citizens of each of the contracting parties shall have, in the dominions and possessions of the other, the same rights as belong to native subjects or citizens, or as are now granted, or may hereafter be granted, to the subjects and citizens of the most favored nation, in everything relating to property in trade marks and trade labels.

"It is understood that any person who desires to obtain the aforesaid protection must fulfill the formalities required by the laws of the respective countries."

Citizens of the United States who desire to obtain registration for their trade marks either in this country or in Great Britain may have the business speedily transacted through the Scientific American office on very moderate terms.

American Institute Exhibition.

It will not be the fault of this paper if the coming exhibition of this Institute should prove to be a chaotic mass of half arranged merchandise on the opening day (September 11), for we have so often given notice of the fact that an exhibition is to be held, and have as repeatedly given notice of the time; nor will it be the fault of the officers of the Institute, for the building is always ready in time; but will, we presume, be the fault of the exhibitor, who, as a general rule, procrastinates, and is often many days behind. We should think that an exhibitor would desire that his exhibit should be arranged upon the opening day, and not a week or ten days later. For information address General Superintendent, room 22, Cooper Union Building, New York.

OLIVER'S SCREW-HEADED KEY.

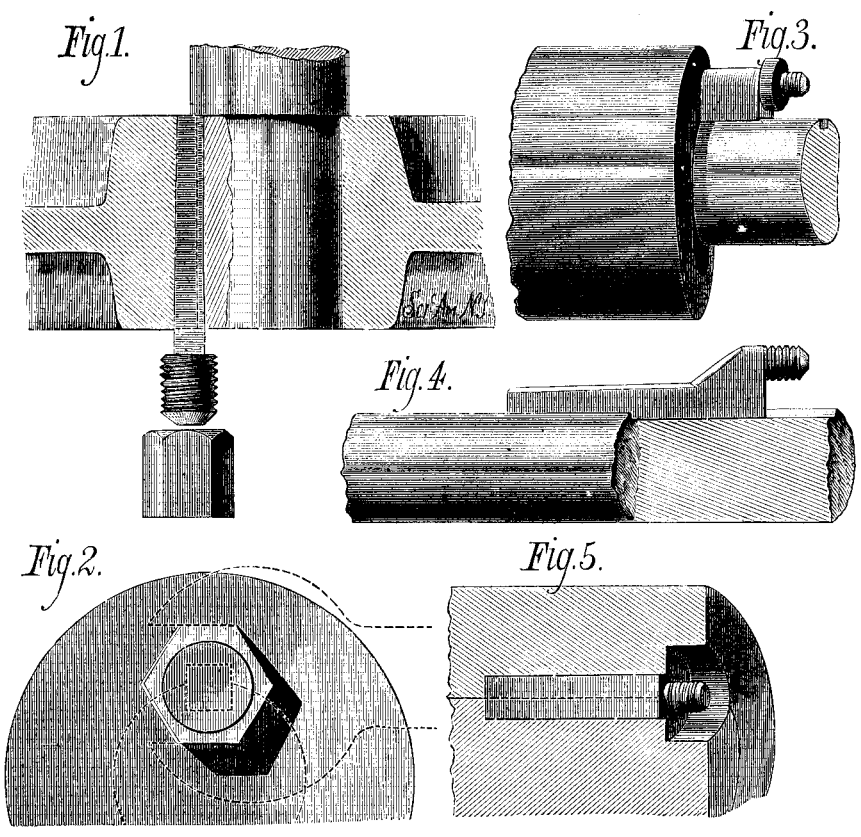
In the several figures in the engraving are represented different forms of a novel key for fastening the bosses of wheels, levers, couplings, etc., to their shafts. The novel feature of the key is its head, which is made cylindrical, and is threaded to receive the nut by which it is drawn from its seat. Where the key has its seat in the end of a shaft, as in Fig. 1, it is made straight, and the threaded portion is larger in diameter than the body of the key, to allow the nut to pass over it as the key is drawn out. In cases where a projecting head would be objectionable, the boss and shaft may be counterbored, as in Fig. 5, so that the end of the key will be even with the end of the shaft. When a key of this sort is to be removed, a short thimble will be placed over the head of the key before applying the nut, and the nut will have sufficient thickness to extend beyond the boss and shaft to receive the strong wrench employed in turning it.

When the key is used on a line shaft its head is offset, as shown in Figs. 3 and 4, to admit of receiving the nut. When the key is to be removed a U shaped piece is slipped over its outer end to form an abutment for the nut to work against. A key having a head of the ordinary form is liable to break under severe stress, and thereby involve considerable labor in drilling it out And when a key is removed by means of a drift applied to its thinner end, the successive blows are apt to upset it and increase the difficulty of removing it.

In a manufactory filled with operatives it often occurs that the whole establishment must be idle for days on account of the difficulty attending the removal of a few keys. The improvement illustrated obviates these difficulties, and affords a quick and certain method of removing keys without injuring them, or the machinery of which they form a part.

In factories where explosive material is used or manufactured, as for example in powder mills, it is of especial advantage, as there can be no danger of explosion, as no blows or friction are required to remove the key, consequently no spark can be produced.

This invention was recently patented by Mr. Paul A. Oliver, of Wilkesbarre, Pa., from whom further information may be obtained.



OLIVER'S SCREW-HEADED KEY.

Export Grain Trade of the Mississippi.

Previous to 1870 it was believed that grain could not be shipped to Europe by way of New Orleans, owing to the warmth and humidity of the atmosphere of the Gulf Stream. To disprove that hypothesis the Grain Association in that year sent experimentally 66,000 bushels of wheat to Europe by way of the mouth of the Mississippi. The next year 3,000 bushels of oats and 309,000 bushels of wheat were exported that way. The next three years the exports averaged about 1,500,000 bushels. In 1875 the shipments fell off to 308,000 bushels. In 1866 the jetty improvements led to the exportation, via New Orleans, of about 1,750,000 bushels, chiefly corn. In 1877 the shipments exceeded four million bushels, comprising 351,453 bushels of wheat, 3,578,057 bushels of corn, and 171,843 bushels of rye.

Japanese Houses and Earthquakes.

From the pamphlet of Messrs. Perry and Ayrton, Professors in the Imperial College of Engineering, Tokio, Japan, we learn that the houses in Japan are without the foundations we are accustomed to use; the vertical posts rest on detached stones, and there are no diagonal braces.

Thus the building can be displaced from its position of equilibrium by an earthquake shock without fracture occurring; the so-called "viscous resistance" to the motion, caused by the various joints, diminishing the motion and adding to the safety of the building, while the absence of diagonal pieces tends to lessen the strains.

NEW TIN ROVING CAN.

Probably there is nothing that causes more waste in the carding room than roving cans with imperfect bottoms. In the accompanying engravings a roving can is shown which is calculated to withstand the abuse to which such articles are usually subjected.

Fig. 1.

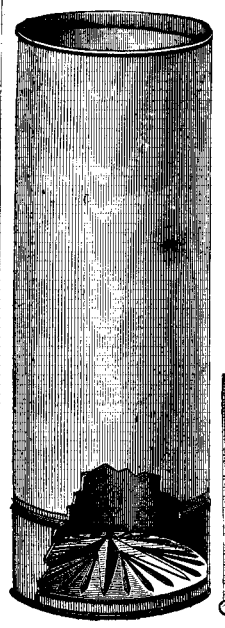


Fig. 2.

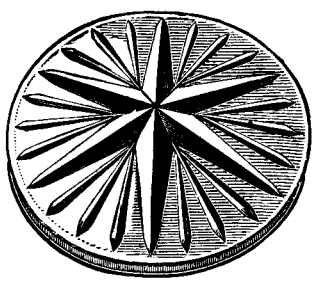
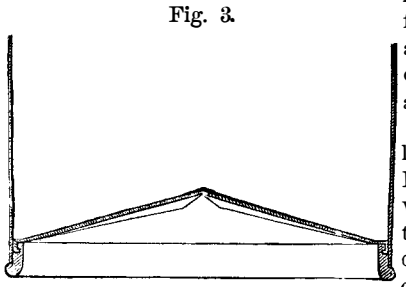


Fig. 3.



The completed can with a portion of its side broken away is shown in Fig. 1. Fig. 2 is a perspective view of the indented bottom, and Fig. 3 is a vertical section showing the manner of putting the parts together.

The bottom is pressed up with a star-shaped indentation in the middle to strengthen and stiffen it. This construction gives the bottom a desirable form and permits of the use of light metal, and at the same time gives it rigidity.

The bottom is attached to a strong tinned iron hoop, and the hoop and bottom together are inserted into the lower end of the can, and a strengthening band is put around the can a short distance, say 5 inches, above the bottom, and attached by beading on to the body. When all of the parts are put together in the manner described, the bottom of the can is placed in a vessel containing melted solder and allowed to remain until the solder enters every seam and attaches the bottom securely to the body of the can, when the can is removed and allowed to cool.

We are informed that there are a great number of these cans now in use, giving great satisfaction.

Patented May 28th and June 18th, 1878, by James Hill, 261 and 263 Dyer street, Providence, R. I. For further particulars address the inventor as above.

New Inventions.

Messrs. Henry J. Hellert, Franck M. Müller, and Charles A. Meyer, of Vincennes, Ind., have patented Improvements in Bowling Alleys, by which the pins may be set up and the balls returned quickly by the players themselves, without requiring any person to attend to the pins and balls.

Messrs. Thomas Massey and William H. Rawe, of Pawtucket, R. I., have patented an improved Stopper for Bottles designed to contain beer or other effervescing drinks or liquids; and it consists in a bottle nozzle having curved slots in opposite sides, and in a yoke adapted to the slots in the bottle nozzle, and to a stopper of novel construction.

Mr. Vanderlyn H. Felt, of Kendall, N. Y., has patented an improved Lifting Jack, for raising the axles of wagons to allow them to be oiled, for raising tracks of railroads to ballast and level them, for raising fences to place blocks beneath them, and for other similar uses.

An improvement in Dyeing Apparatus has been patented by Mr. Alphenas V. Hysore, of Wilmington, Del. This improvement relates to apparatus for manipulating stock in a dye house, and for transferring it from one dye vat to another. It consists in an arrangement of hoisting mechanism and a track and a car of peculiar construction, to facilitate the transfer of stock from one vat to another.

Mr. Marcus H. Rogers, of Great Barrington, Mass., has patented an improved Newspaper Folding Machine. This invention relates to the class of machines that are employed in folding newspapers for mailing. The advantages claimed for this machine are that it may be placed under the fly of an ordinary power printing press, and it may be used in conjunction with the press, folding the papers as fast as they are printed.

Messrs. Charles E. Hart and Toby Johnson, of Lake Lillian, Minn., have patented a Combined Burglar Alarm and Indicator, which is operated whenever a cord, connected with the doors and windows of a dwelling, is subjected to tension by the act of opening a door or window. The place or apartment where the burglar is seeking an entrance is indicated upon a register, by means of numbers, one number indicating one place or apartment, and another another.

An improved Bottle Stopper has been patented by Mr. Alexandre Esprit Napoléon Agnel, of Paris, France. This is an improvement in the class of adjustable screw caps or stoppers for bottles used for perfumery, tooth washes, toilet waters, medicines, etc., from which it is desirable to discharge the liquid in drops or fine jets.

An improved Bobbin has been patented by Mr. John S. Crowley, of Manchester, England. The object of this invention is to protect wooden bobbins used in the manufacture of textile fabrics. It consists in a notched ring that is attached to the lower end of the bobbin, for receiving the lugs of the bobbin wheel.

Mr. Amandus Henning, of New York City, has patented an improved Stereotype Block. When the stereotype plates are secured to their blocks by the common method, and it is desired to adjust one of them in a form, it is necessary to unlock the entire form, thereby endangering the arrangement of the other blocks in the form, so that it frequently becomes necessary to readjust the form. Another difficulty common to the ordinary method of holding stereotype plates is that the face of the plate, near its edges, is often injured by the tools employed in fastening the blocks and locking the form. By this improvement these difficulties are obviated.

An improved Water Reservoir and Stove Pipe Shelf has been patented by Mr. John W. Barton, of Emporia, Kan. The object of this invention is to provide a cheap and convenient water reservoir, to be attached to the stove pipe, and to furnish a shelf for holding articles over the stove to keep them warm. The water in the reservoir is warmed without expenditure of extra fuel, and the space occupied by the reservoir is not available for other uses.

Mr. James Dawson, of Brooklyn, N. Y., is the inventor of an improved Attachment for the Hose of Fire Engines, the use of which will enable liquid chemicals to be introduced into the stream of water passing through the hose, so as to be thrown upon the fire with said water, and thus avoid the necessity of having a separate engine for throwing chemicals.

An improved Lamp Bracket has been patented by Mr. Bruno A. Neisser, of Battle Creek, Mich. The object of this invention is to provide a cheap and simple device, attachable to a sewing machine table, for supporting and adjusting the position of a lamp to light the operative at work without preventing the free passing on table of the garment operated upon.

Messrs. George L. Neville and Leroy C. Godwin, of Portsmouth, Va., have invented an improved Device for Canceling Stamps, which consists in a cap having thin sharp edges and two points, which are inserted in the stamp from the back and bent down over its face, to hold the edges of the cap against the back of the stamp.

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An improved Invalid Chair has been patented by Mr. Cevedra B. Sheldon, of New York city. This invention relates to improvements on an invalid chair for which letters patent No. 173,071 were granted to him February 1, 1876, and it consists in a novel arrangement of the movable seat, back and foot rest, which permits of the ease adjustment of the chair or the quick conversion of it into a reclining chair or lounge.

Mr. Moritz Jonas, of New York City, has patented an improved Cigar Package, composed of a series of bundles prismatic in cross section, and placed together so as to dovetail into each other.

An improvement in the manufacture of Hydraulic Cement has been patented by Mr. John Dimelow, of Austin, Texas. The object of this invention is to furnish a superior article of hydraulic cement from refuse material which is now regarded as worthless, so that any city can supply itself with all the cement it requires for building and other purposes at a comparatively small cost. It consists in a hydraulic cement formed of rotten, decomposed, or refuse limestone or marble and the deposit of rivers, in about equal proportions.

Mr. John H. Tays, of New Braunfels, Texas, has patented an improved Draw Gauge for cutting leather straps of any desired width. It may be adjusted to any required width without being liable to slip, as in the common draw gauges.

Mr. John M. Pfaudler, of Rochester, N. Y., has patented an Apparatus for Regulating the Pressure in a Series of Fermenting Vessels. The invention has for its object to provide an effective apparatus for equalizing the pressure in a series of hogsheads or other vessels containing beer, wines, or other liquids in a state of fermentation, and for regulating the pressure of the gas caused by such fermentation, so that it shall not exceed a certain number of pounds to the square inch previously determined and gauged in the said apparatus.

Mr. Wm. Manley, of Rochester, N.Y., has patented an improved Machine for Rubbing the Seams of Boots and Shoes, which holds the uppers of boots and shoes firmly and smoothly while the seams are being opened and rubbed down. It enables the work to be done quicker and better than when done in the usual way.

Mr. John R. Spearman, of Silver Street, S. C., has patented a simple and effective Device for Protecting Bees from the destructive moths which enter the hives, and, depositing their eggs at the bottom of the hive or stand, gradually work upward under cover of their own webs until they reach the honeycomb and cause the bees to abandon the hive.

An improved Stop Motion for Drawing Frames has been patented by Mr. Walter S. Kelley, of North Weare, N. H. This invention consists in an improved mode of connecting together the catch lever and the trumpet guide used on a drawing frame in cotton mills to stop it when the end or sliver breaks or contains fine places, the object being to allow of throwing back the trumpet in a convenient position for inserting the end or sliver, and to allow of adjusting the altitude of the free end of the catch lever to accommodate inequalities in the drawing frame.

Mr. Osmond M. Johnston, of Brownsville, Pa., has patented a Burial Casket, formed of potter's clay, and having transverse and longitudinal ribs formed on the inner surface of the top, sides, and bottom.

Mr. Charles Waller, Jr., of Baraboo, Wis., is the inventor of an improved Gate and Door Latch, by which a door may be fastened and yet opened under different degrees of force, depending on the adjustment of the latch, thus enabling a person to open and shut the door by merely pulling the door on one side or by pushing it on the other. It is also designed to answer the purpose of a lock.

Messrs. Harman Brocious, Hiram E. Bensinger, and Samuel Wragg, of Raven Run, Pa., have patented an improved Lubricator, which consists in a novel arrangement of an oil cup or lubricant holder, and a novel construction and arrangement of devices employed in connection therewith, whereby the lubricant is automatically supplied at regular intervals and in uniform quantities.

Mr. Samuel Keim, of Altoona, Pa., has patented an improvement in Millstone Dresses, the object of which is to cause the grain to be thrown away from the eye of the stone and carried to the flouring surfaces before it is ground fine, and thereby reduce the quantity of middlings by entirely freeing and pulverizing the flour.

Mr. Robert Kirkpatrick, of Richmond (Debec P. O.), New Brunswick, Canada, is the inventor of a simple and convenient Device for Ascertaining the Weight of Articles too heavy for being placed on the scale by the hands alone, and so constructed that such articles may be elevated from the ground and weighed by the same device.

Mr. Julius Brunner, of Morrisania, N. Y., has patented an improved Toy Pistol, which consists in a stock containing a spring hammer and a star wheel, arranged in the stock so as to trip the spring hammer and explode the percussion paper carried by the wheel.

The Durability of Railroad Ties.

According to *Le Fer*, at a meeting of directors of the German railroads held at Constance, the following information was furnished in regard to the relative value of the different methods of injecting ties:

First.—Railroad from Hanover and Cologne to Minden.

Pine ties injected with chloride of zinc; after 21 years the proportion of ties renewed was 21 per cent.

Beech ties injected with creosote; after 22 years, 46 per cent.

Oak ties injected with chloride of zinc; after 17 years, 20·7 per cent.

Oak ties not injected; after 17 years, 49 per cent.

The conditions were very favorable for experiment; the road bed was good, and permitted of easy desiccation.

The unrenewed ties showed, on cutting, that they were in a condition of perfect health.

Second.—Railroad "Kaiser-Ferdinands-Nord."

Oak ties not injected; after 12 years the proportion renewed was 74·48 per cent

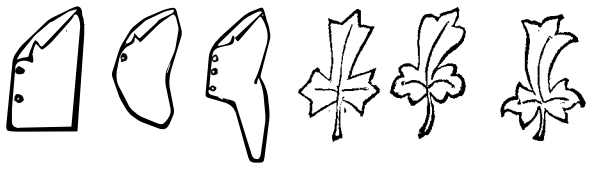
Oak ties injected with chloride of zinc; after 7 years, 3·29 per cent.

Oak ties injected with creosote; after 6 years, 0·09 per cent.

Pine ties injected with chloride of zinc; after 17 years, 4·46 per cent.

National Characteristics.

The national character of a people is expressed in its dress and its ornaments in the same manner that handwriting carries with it the character of the writer. For example, says Mr. John Moser in the *American Architect*, take the English, the French, and the German. In England the leaders of fashion, etc., are from twenty to thirty years old; in France, old and young alike interest themselves; in Germany, the old professor gives the tone in art matters. Now take a coat of each and note the characteristics of the people



in the cut of it: the English, square and angular; the French, graceful and soft in its lines; and the German has some of the former, and adds some scholasticism inclining to the pedantic. Take, again, the treatment of a simple trefoil by the different peoples; and we find the first is all vigor, nearly everything in straight lines; the second is all grace and elegance; the last, with some vigor (sharp corners), and some grace in the motion, has the scholasticism in the central divisions, which must all have the convex and concave sweep. Now it seems to me a big sunflower hewn out with a broad-ax does not express the national character of this great people; and yet there is so much of this crudeness in the ornamentation of our day, that I cannot think of anything else that would fill the bill; and I feel that our leading men should be able to give us something original, appropriate for our time (we are no longer in the dark ages), that would be characteristic of us, and that would not disgrace us when the future antiquarian shall find the sites where we dwelt and worked.

How Salmon are Canned.

A special correspondent of the *World*, writing from New Westminster, British Columbia, under date of July 10, reports a good deal of activity along the Frazer river, the salmon having begun to run.

There are at present eight canneries on the Frazer, each employing from 250 to 300 men. Both American and English firms have capital invested in the enterprise. The river at this time presents a very busy appearance. The fishing boats have their nets spread day and night, and some very good hauls have already been made. The fish taken so far are very small, the average weight when trimmed being only five pounds. People in the East and in England probably have very indistinct ideas of the manner in which the canned salmon that appears on their tables is prepared. The mode is as follows: A company comes here, and having selected a site on the banks of the Frazer, proceeds to erect a cannery. This consists generally of several low, long wooden buildings, comprising a boat house to contain the fishing boats, of which each cannery has some thirty or forty, an engine room, a boiling room containing vats in which the fish are boiled, a tin room where the cans are made, packing rooms, and a large room in which the fish undergoes the various processes previous to shipment to market. Some of the canneries find it advantageous to let out their work to Chinese firms, who undertake to supply all the labor necessary to dress the fish after it is caught and prepare it for canning. But the majority of firms take charge of the whole of their business. At stated times after the nets are laid across the river the boats return to the cannery and land their catch. This is immediately seized by the Chinese workmen, for by far the greater part of the indoor work is done by Mongolians, and washed. The fish are then slit up and cleaned and the head removed. Then they are passed on to the next block, which consists of a machine with a number of sharp blades joined to a shaft which is turned by a handle. The blades are just so far apart that the salmon when cut will be the correct length to fill an ordinary one pound can. The next stage consists in filling the cans. The fish is rammed and jammed and squeezed into the tins, and it is this part of the proceedings that would make one who had seen the process unwilling to eat the salmon when it is ready for sale. Next the covers are placed on and soldered. They are then perfectly air tight and are forwarded to the boilers. These consist of vats some five feet in height and about four feet in length and breadth Into these, which contain boiling water, the cans are plunged and allowed to remain two hours or so. At the end of that time they are taken out and allowed to cool. A hole in the center of the cover that had been soldered up at first is now opened by placing a hot iron over the solder. The melted metal drops into the can, and this accounts for the several shotlike bodies found in each tin. This vent being opened, all the gases generated in the boiling are allowed to escape. Afterward the cans are passed on to the next department, when they are rendered air tight once more, and further on to workmen who dip them in a varnishlike composition. Later they come to the labeling department, after which they are ready to be packed in four dozen cases and shipped. This is the whole process of canning. Thus a salmon enjoying life and liberty and in the full pursuit of happiness at 9 o'clock may find himself snugly packed away in a can at 12 and ready for the American market, labeled as the finest Frazer river salmon. In less than fifteen days after the same fish may be sold in New York, and a few days later in London, not, however, until the Frazer river label has been torn off and an English one substituted, when the new importation then appears under the name of fine Scotch salmon.

In the tin making and other mechanical departments, without which no cannery is complete, every labor saving contrivance possible is used. Two new canneries have been erected this season, and the salmon fishery has thus become one of the principal industries of this section of the colony.

New Mechanical Inventions.

An improvement in Fly Wheels for Sewing Machines has been patented by Mr. Albert Decker, of Kankakee, Ill. This invention relates to improvements in the fly or band wheels of sewing machines. The fly wheel may be allowed to turn loosely on its shaft when winding up the bobbin, so as to prevent the running of the machine, save the wear of the same, and dispense with the necessity of taking the work out of the machine while winding up the bobbin.

Mr. Charles E. Macarthy, of Forsyth, Georgia, is the inventor of an improved Horse Power. The invention is an improvement upon the horse power for which letters patent were granted the same inventor March 26th, 1878, in which an endless rope belt is distended around two pulleys in the same plane, and one side of said belt is wrapped once around a horizontal master wheel at right angles to the said pulleys. The improvement consists in certain details of construction which render the machine more complete and effective.

Mr. Thomas B. Gunning, of New York city, has patented an improved Ejector for Oil Wells, which consists of two pipes, one within the other, so adjustable relatively by a lever, and connected with a nozzle and a valve, at their lower ends, that the air forced down one pipe is turned by the nozzle into and up the other, so that an upward current is produced, which sucks up from the bottom of the well and carries its fluid contents up through the ejection pipe, the bore of which is clear of any obstruction to the rising fluid.

Messrs. James W. Crossley, Augustus A. Hagen, and George Juengst, of New York city, have patented an improved Tobacco Cutting Machine, which is designed for cutting plug tobacco. It consists in a certain construction and combination of parts, which cannot be readily described without an engraving.

Mr. Philip Whightsil, of Pickerington, Ohio, is the inventor of an improved Nipping and Clinching Tool, embracing in one implement both nippers and clinchers, which are pivoted to opposite sides of a common handle.

Mr. Leonard Anderson, of Painesville, Ohio, has patented an improved Machine for Cutting Veneers, either straight or tapered, for pails, buckets, etc., from logs of any size. It will cut the veneers evenly and without breaking or checking them.

Mr. William L. Miller, of Santa Rosa, Cal., has patented an improved Pump Valve, which consists in an elastic hemispherical valve, of rubber or other material, having a metallic valve stem and rigid backing. It has a check strap for limiting the lift of the valve, which is attached to the top of the valve and to the leather packing of the pump.

An improved Pump Handle has been patented by Mr. John Chegwidden, of New York city. This invention relates to pump handles for operating a single pump from different floors of a building; and it consists in the combination of a series of racks and toothed sectors of peculiar construction with a series of handles and a rod which extends from the pump through two or more floors, whereby any handle in a series of handles connected with a single pump rod may be operated without moving the other handles.

An improved Permutation Lock has been patented by Mr. James T. Speer, of Oelwein, Iowa. This invention relates to the class of locks that are applied to money drawers; and it consists in a lock having two notched and perforated permutation wheels or tumblers, and a key of peculiar construction for operating the same.

The Darien Canal Project.

Lieutenant Wyse, of the French navy, in charge of the French expedition for surveying canal routes across the Isthmus of Panama, has decided in favor of the northern route, running from Acanti, southwesterly, to the Island of Alligators, thence down the Tupisa to Darien. This line, he claims, presents fewer engineering difficulties than the southern route, which involves a system of locks and tunneling, besides being nearly twice as long as the line proposed.

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Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Lubricene.—A Lubricating Material in the form of a Grease. One pound equal to two gallons of sperm oil. R. J. Chard, New York.

Elevators, Freight and Passenger, Shafting, Pulleys, and Hangers. L. S. Graves & Son, Rochester, N. Y.

Quick Speed Drill sent for $2.50; with frame, $3.50. Send stamp for circular. J.D.Foot, Box 2279, New York.

Wanted.—150 feet 2¼ or 2⅛ inch rough or turned Shafting, new or second-hand. Address Smith & Chupp, Lithonia, Ga.

Telephones.—J.H.Bunnell, 112 Liberty St., New York.

Hearing Restored.—Great invention by one who was deaf for 20 years. Send stamp for particulars. Jno.Garmore, Lock Box 905, Covington, Ky.

Patent Table and Bedstead. Send stamp for circular. W. K. Sawyer, Patentee, Three Oaks, Mich.

Sheep's Gut Belting.—Makers will please address Wilson & Hendrie, Montague, Mich.

Bolt Forging Machine & Power Hammers a specialty. Send for circulars. Forsaith & Co., Manchester, N. H.

A Lee Moulding Machine, second-hand, but as good as new, cost $800, will be sold for $500, including a lot of cutters that cost over $150. I.N.Keyes, Worcester, Mass.

Catalogue of Scientific Books. Mailed free on application. E. & F. N. Spon, 446 Broome St., New York.

Wanted.—A good second-hand or new Bolt Heading Machine, with latest improvements. Address Frick & Co., Waynesboro, Franklin Co., Pa.

For the most durable and economical Paint for cars, roofs, bridges, iron, brick and wooden buildings, address Pittsburg Iron Paint Company, Pittsburg, Pa.

J. C. Hoadley, Consulting Engineer and Mechanical and Scientific Expert, Lawrence, Mass.

For Town and Village use, comb'd Hand Fire Engine & Hose Carriage, $350. Forsaith & Co., Manchester, N. H.

Boilers ready for shipment, new and 2d hand. For a good boiler, send to Hilles & Jones, Wilmington, Del.

Best Steam Pipe & Boiler Covering. P.Carey, Dayton, O.

Foot Lathes, Fret Saws, 6c., 90 pp. E.Brown, Lowell, Ms.

Sperm Oil, Pure. Wm. F. Nye, New Bedford, Mass.

Power & Foot Presses, Ferracute Co., Bridgeton. N. J.

Water Wheels, increased power. O.J.Bollinger, York, Pa.

North's Lathe Dog. 347 N. 4th St., Philadelphia, Pa.

Punching Presses, Drop Hammers, and Dies for working Metals, etc. The Stiles & Parker Press Co., Middletown, Conn.

All kinds of Saws will cut Smooth and True by filing them with our New Machine, price $2.50. Illustrated Circular free. E. Roth & Bro., New Oxford, Pa.

Hydraulic Presses and Jacks, new and second hand. Lathes and Machinery for Polishing and Buffing Metals. E. Lyon & Co., 470 Grand St., N. Y.

Nickel Plating.—A white deposit guaranteed by using our material. Condit, Hanson & Van Winkle, Newark, N.J.

Cheap but Good. The "Roberts Engine," see cut in this paper, June 1st, 1878. Also horizontal and vertical engines and boilers. E. E. Roberts, 107 Liberty St., N. Y.

The Cameron Steam Pump mounted in Phosphor Bronze is an indestructible machine. See ad. back page.

1,000 2d hand machines for sale. Send stamp for descriptive price list. Forsaith & Co., Manchester, N. H.

Presses, Dies, and Tools for working Sheet Metals, etc. Fruit and other Can Tools. Bliss & Williams, Brooklyn, N. Y., and Paris Exposition, 1878.

Manufacturers of Improved Goods who desire to build up a lucrative foreign trade, will do well to insert a well displayed advertisement in the SCIENTIFIC AMERICAN Export Edition. This paper has a very large foreign circulation.

Improved Wood-working Machinery made by Walker Bros., 73 and 75 Laurel St., Philadelphia, Pa.

Bound Volumes of the Scientific American.—I will sell bound volumes 4, 10, 11, 12, 13, 16, 28, and 32, New Series, for $1 each, to be sent by express. Address John Edwards, P. O. Box 773, New York.

For Solid Wrought Iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

The SCIENTIFIC AMERICAN Export Edition is published monthly, about the 15th of each month. Every number comprises most of the plates of the four preceding weekly numbers of the SCIENTIFIC AMERICAN, with other appropriate contents, business announcements, etc. It forms a large and splendid periodical of nearly one hundred quarto pages, each number illustrated with about one hundred engravings. It is a complete record of American progress in the arts.

We make steel castings from ¼ to 10,000 lbs. weight, 3 times as strong as cast iron. 12,000 Crank Shafts of this steel now running and proved superior to wrought iron. Circulars and price list free. Address Chester Steel Castings Co., Evelina St., Philadelphia, Pa.

Special Planers for Jointing and Surfacing, Band and Scroll Saws, Universal Wood-workers, etc., manufactured by Bentel, Margedant & Co., Hamilton, Ohio.

Mill Stone Dressing Diamonds. Simple, effective, and durable. J. Dickinson, 64 Nassau St., N. Y.

Machine Cut Brass Gear Wheels for Models, etc. (new list). Models, experimental work, and machine work generally. D.Gilbert & Son, 212 Chester St., Phila., Pa.

Holly System of Water Supply and Fire Protection for Cities and Villages. See advertisement in Scientific American of last week.

Kreider, Campbell & Co., 1030 Germantown Ave., Phila., Pa., contractors for mills for all kinds of grinding.

The only Engine in the market attached to boiler having cold bearings. F.F.& A.B.Landis, Lancaster, Pa.

Self-feeding Upright Drilling Machine of superior construction; drills holes from ⅛ to ¾ inch diameter. Pratt & Whitney Co., Manfrs., Hartford, Conn.

Solid Emery Vulcanite Wheels—The Solid Original Emery Wheel—other kinds imitations and inferior. Caution.—Our name is stamped in full on all our best Standard Belting, Packing, and Hose. Buy that only. The best is the cheapest. New York Belting and Packing Company, 37 and 38 Park Row, N. Y.

Hydraulic Cylinders, Wheels, and Pinions, Machinery Castings; all kinds; strong and durable; and easily worked. Tensile strength not less than 65,000 lbs. to square in. Pittsburgh Steel Casting Co., Pittsburgh, Pa

The Turbine Wheel made by Risdon & Co., Mt. Holly, N.J., gave the best results at Centennial tets.

For Shafts, Pulleys, or Hangers, call and see stock kept at 79 Liberty St. Wm. Sellers & Co.

Wm. Sellers & Co., Phila., have introduced a new Injector, worked by a single motion of a lever.

NEW BOOKS AND PUBLICATIONS.

WOODWARD'S NATIONAL ARCHITECT. Vol. II. By George E. Woodward. Published by the American News Company. Price $7.50.

This is another volume by an architect who has prepared a number of similar works, containing original designs, plans, and details on working scale for city and country houses. The designs are tasteful, and with the details extend over 100 large plates. There are several good plans for city houses; also of country villas, the last being quite handsome as well as moderate in price. Works of this character are always useful to the profession for which they are intended, and not merely the architects but the public generally are indebted to Mr. Woodward for the establishment of better standards of taste than those which commonly prevail in our rural architecture. It is almost always as cheap to construct a house that is pleasing to the eye as one which is not so, the question of interior planning aside, and the showing of how to do this is not the least of the many good qualities of Mr. Woodward's work.

CHEMISTRY, THEORETICAL AND PRACTICAL, AS APPLIED TO THE ARTS AND MANUFACTURES. Illustrated. Philadelphia: J. B. Lippincott & Co. Parts 31 to 35.

These parts carry Messrs. Lippincott & Company's "New Encyclopedia of Chemistry" through opium, paper, perfumery, petroleum, phosphorus, photography, pigment, platinum, and potassium. Of the general scope and character of the work mention has already been made.

Notes & Queries

(1) H. C. B. asks: Is it dangerous to use water from a cooler lined with zinc? Cistern water and ice, some say, in a cooler lined with zinc, is poison. A. See article on this subject, p. 369, vol. 36, SCIENTIFIC AMERICAN.

(2) F. & Co.—See reply to J. H. K. in No. 2 of current volume.

(3) H. P. B. asks: I want to know how to silver the inside of a glass globe. I wish to use crystals of silver or nitrate of silver. A. See pp. 1670, 921, and 1928, SCIENTIFIC AMERICAN SUPPLEMENT.

(4) E. R. J. asks for a good recipe for a head wash or shampoo, something that is effective and not injurious to head or hair. A. You may use a rather dilute solution of good glycerin soap in alcohol, to which a little cologne water has been added. Wash it out with plenty of water, and rub the scalp with a clean and not too wiry brush.

(5) D. H. B. asks: What is about the average frequency of each letter of the alphabet in ordinary printing? A. Taking 110,000 letters, which gives round numbers for every letter, the alphabet is used in printing in the English language in the following proportions: a, 8,600; b, 1,600; c, 3,000; d, 4,400; e, 12,100; f, 4,500; g, 1,700; h, 6,400; i, 8,600; j, 400; k, 800; l, 4,300; m, 3,000; n, 8,000; o, 8,000; p, 1,700; q. 500; r, 6,200; s, 8,000; t, 9,000; u, 3,400; v, 1,200; w, 2,000; x, 400; y, 2,000; z, 200.

(6) G. C. writes: I wish to build a steam launch of about 50 feet in length. I wish to develop as much horse power as can be had in so small a launch. I do not care so much for convenience as I do for speed. I have the facilities for building the engines, and would undertake to build the hull (if advantageous for speed) of steel. A. We think you will get the information in the SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 14, 69, 75, and 81.

(7) I. B. C. asks how the most improved telephonic alarm is made. A. There are several in existence. We believe they are substantially alike. They consist of a small magneto-electric machine and a call bell.

(8) J. B. asks how to make a japan to use on paper or leather. A. Burnt umber, 8 ozs.; true asphaltum, 3 or 4 ozs.; boiled linseed oil, 1 gallon; grind the umber with a little of the oil, add it to the asphaltum, previously dissolved in a small quantity of the oil by heat, mix, add the remainder of the oil, boil, cool, and thin with a sufficient quantity of oil of turpentine.

What is the simplest method of making an oven, 3½ feet long, 3 feet wide, 3 feet deep, to get a regular heat of 180° Fah.? I have no steam. A. Make it like a common stove oven. Any sheet iron worker can make one.

(9) J. R. asks: What kind of revolver is approved by the United States for army and navy? Are the self cocking kind approved of? A. The self-cocking revolvers are not adopted as the standard in either branch of the service. We believe the Remington single barrel pistol is used almost exclusively in the navy, and that in the army, up to a late date, no positive recommendation had been made for the exclusive adoption of a single pistol. We shall be glad to receive corrections if in error.

(10) Young Engineer writes: I want to get a book that will teach me all the principal points about an engine, and will assist me to get my license. A. We can recommend Bourne's "Catechism" and "Handbook of the Steam Engine," and Reed's "Engineer's Handbook."

(11) G. W. asks whether it is necessary to procure a license for a small boat, 20 feet long, 8 feet beam, run by steam and intended for pleasure purposes entirely. If so, please give me the necessary instructions in order to secure one, and the price of same? A. Yes. Apply to the local inspector in your district.

(12) J. L. B. writes: 1. We have a steam tubular boiler (locomotive type) which when cold will not show water at the gauge cocks unless we open the whistle valve, which is accompanied by a peculiar noise. Would you please tell us the cause? A. We judge that there is a vacuum in the boiler, the steam having condensed. It is well to prevent this by opening a valve. 2. What is the rule to get the pitch of propeller? A. Make it about 1½ time the diameter. 3. Could you give me the address of any firm selling galvanized iron life boats? A. Insert a notice in the "Business and Personal" column.

(13) C. B. F. asks where to get a good caloric engine. A. Insert a notice in the "Business and Personal" column if what you want is not noticed in our advertising columns. We never recommend special machines in this department of the paper.

(14) W. T. N. writes: Suppose it were necessary to make a man insensible for a short time, how long would it take to make him so by the use of chloroform to get him in that condition? A. If applied to the exclusion of air, ordinarily about three minutes, but this depends in a great measure upon the person's temperament and state of health. The administration of coloroform by inexperienced persons is a dangerous proceeding. See p. 395, SCIENTIFIC AMERICAN, and p. 105, vol. 36.

(15) P. C. writes: I have a brass dial with oil painting on a portion of its surface. I now desire to silver plate the unpainted part only, and I wish to know if there is any method by which I can so protect the painting that when it is dipped in the bath it will not be affected? A. Paraffin applied warm will doubtless answer the purpose.

(16) W. A. writes, in vol. 39, p. 75, query No. 20, that he is running an 18 inch saw, and has trouble with boxes heating. I had same trouble, and overcame it by using raw hide nicely fitted by cutting out a portion of Babbitt, softening raw hide in water, putting mandrel in place, screwing down caps. Let remain until dry. Then a few drops of oil two or three times a day were sufficient. The pieces lasted eight months, and no more hot journals.—E. J. O.

(17) A. L. K. asks: What are the uses of powdered charcoal when used on a large scale? A. As a non-conducting material for packing the walls of ice houses, etc., and the manufacture of gunpowder and fireworks; in metallurgy for deoxidizing and carbureting metals; to decolorize saccharine and other liquids; for the purification of potable water, etc., and the preservation of meat; in medicine, externally, as an antiseptic and disinfectant; internally sometimes in dyspepsia, diarrhea, dysentery, and heartburn. It is also used mixed with pitch, oil, etc., as a preservative paint, and for crayons, tooth powder, etc.

(18) W. J. H. asks: Does the practice of whistling prove detrimental to the singing properties of the voice? A. We think not.

How can photograph proofs be made permanent, and how reproduce the glossy surface of a new photograph upon old ones? A. Soak them for a few minutes in a strong aqueous solution of sodium hyposulphite, rinse with clean water, and pass through three separate portions of water, containing about ½ of 1 per cent of sodium hypochlorite, allowing 3 or 4 minutes for each immersion; then wash in clear water and dry.

How can gutta percha be best repaired? A. You can use the cement recommended on p. 250, vol. 38, SCIENTIFIC AMERICAN.

Can you give me the best professional time for a 1 mile walk? A. Wm. Perkins, of London, in 1874, walked 1 mile in 6 m. 23 sec.

Can you give me a recipe for making gold and silver ink used for writing? A. See recipes on pp. 11 (38), 250 (2) and (4), and 251 (60), vol. 38.

(19) J. R. asks (1) how to braze brass together with a blowpipe? A. You will find directions for soldering in SCIENTIFIC AMERICAN SUPPLEMENT No. 20. 2. How can I make a good shellac varnish to use on gun stocks? A. Dissolve gum shellac in alcohol. 3. Is a shaft of 10 feet in length as liable to twist as one that is 20 feet long, both shafts to be of the same diameter and subjected to the same torsional strain? A. No.

(20) S. K. S. writes: "Natural Philosophy" says; "Like poles neutralize each other's attraction for unmagnetic iron." Then by way of explanation says: "Immerse the positive poles of two magnets separately in iron filings. On withdrawing them, both will be covered with large tufts. Now bring them together, and the filings will immediately drop off from both. The result will be the same if the experiment be tried with the negative poles of two magnets." I have tried the experiment with a couple of bar magnets 4 x 1 x ¼. Each would support a piece of iron 4 x ¼ x ¼, and not a particle would fall off. Then I tried it with small nails, and only two or three would fall. The filings were taken from common bar iron. What is the matter? A. The magnets should be of equal strength. We find no difficulty in performing an experiment successfully. Are you not mistaken as to the poles of your magnets?

(21) H. writes: A. buys a farm for $40,000 and sells it to B. for $45,000. B. becoming tired of the farm sells it back to A. for $35,000. How much does A. clear? A. At the end of the transaction A. has his farm and $10,000.

(22) J. V. B. asks: What are the proportions of silicate of soda and water to get a good solution? A. It is requisite to boil the silicate with the water for some time to effect complete solution. The commercial silicate usually contains more or less free silica, which is insoluble in water and of course remains as a residue after extracting the soluble glass. You may dissolve about 3 ozs. of the silicate in a pint of boiling water, taking care to replace fresh water for that lost by evaporation.

(23) D. M. asks: Has there been a lens or glass for a kind of spectacle that can be worn on the eye invented, which will enable one to see, on an ordidary dark night, in a closed room, the time of night on a clock face, or the features of another person ten feet from him, without the aid of artificial light—solar light being admitted through two ordinary windows, unshaded? A. As we understand you, no.

How can I distill on a small, cheap scale a strong quality of oil of vitriol ($H_2S_2O_7$) for experimental purposes from sulphate of iron, the green vitriol being no cost? A. Heat the ferrous sulphate until deprived of the greater part of its water of crystallization; place it in a suitable earthenware retort, expose the retort to a strong red heat, and as soon as the acid begins to distill over, adapt and lute the beak of the retort to a capacious earthen receiver containing a very small quantity of water, or, better, of ordinary sulphuric acid. During the distillation the receiver must be kept cool in running water.

Can I get sufficient heat from a gas burner to fuse the copperas? A. No.

1. Can vegetable ivory, manufactured from India rubber and magnesia, be used for handles which require a nice polish? Also can it be carved? A. According to the inventor, yes. 2. Is it of a clear white color? A. We believe not. 3. What is the formula for making it? A. It has not been published.

What is the best saw blade for cutting steel and iron, and how can I temper a thin saw blade for that purpose? Stubs'; harden the blade in oil; temper by heating the blade until the oil blazes.

(24) O. F. L. asks: Which is the best way to make gas carbon, and how to solidify, that is, make it into buttons? A. They may be cut from the dense plates of carbon used in galvanic batteries. Or press the dust of gas carbon or coke, made adhesive by gas tar, into suitable iron moulds, and subject it in the muffle to a heat gradually approaching low redness. Then repeatedly saturate it with a thick sirup of gas tar and heat in the muffle as before. See pp. 187 (2) and 213 (2), vol. 37, SCIENTIFIC AMERICAN.

Please give a good method of cleaning plate glass windows thoroughly. A. Use a little fine whiting moistened with lime water, rinse with clean water, and dry with soft, unsized paper.

(25) H. M. A. asks: 1. Is there any telephone that can be heard several feet from diaphragm? A. Not distinctly. 2. If so, will a larger spool of wire help it any? A. No. 3. Can a broken piece of carbon 2½ inches by 1 inch and 8 inches long be glued together? If so, how? A. Use gas tar, and after joining heat slowly to low redness in a muffle.

1. What chemicals are used in a barometer? A. Pure mercury only is used. 2. Can one be made from a glass tube 8 inches long, sealed airtight? A. No. The tube must be at least 33 inches long.

(26) J. H. writes: 1. By boiling peach seed kernels in distilled water to a strong solution, will it be a poisonous article? A. The crushed kernels of peaches when boiled with water yield a liquid distillate containing hydrocyanic (prussic) acid, which is extremely poisonous, and the wash or undistilled portion usually retains a trace of the substance. 2. Would it be safe to take inwardly? A. No.

(27) J. B., Jr., asks how to manufacture a first class sewing machine oil, that will not gum. A. You may prepare a fine lubricant as follows: Digest olive oil for about 30 days with a quantity of clean lead turnings (sufficient to nearly fill the vessel); then filter the clear oil through 24 inches or more of clean (free from dust) granular charcoal. Or agitate good sperm oil by injected steam for about half an hour, and after reducing its temperature to about 40° Fah., press the fluid portion through several thicknesses of fine linen cloth, warm, and filter as before.

(28) E. C. D. asks if there is any truth in the popular superstition that splitting a crow's tongue will make it talk. A. No.

(29) C. J. C. writes: I hold horizontally between my two hands a small spring scale. I exert power enough with both hands to cause the scale to register 24 lbs. How much power do I exert with each hand? A. 24 lbs.

(30) E. A. H. writes: Suppose an ordinary hickory bow of same cross section throughout strung and ready for use. What is the curve formed by the outer edge? Is it a true circle? After the bow has been distended by drawing the arrow, what is the curve then? If neither of these curves is a circle, can a bow in the first position be made to take a circular form by any change in the cross sections at different points, and if so, what change will affect it? A. It would be impossible to give a general answer to the above questions, since the curve will probably vary a little in the case of every bow, rendering it necessary to determine the curve experimentally for each example.

(31) C. W. C. asks how the extra fine finish is given to microscopic and telescopic lenses. A. Rouge or putty powder is applied in the form of paste to the finely ground surface by means of a rotating tool covered with pitch or with silk.

(32) C. J. B. would like to know how to set the valves of double engine with slide valves scientifically, say a locomotive. A. You will find full information in Auchincloss' treatise on "Link and Valve Motions," also many rules in back numbers of the SCIENTIFIC AMERICAN. We could not treat the subject properly in the limited space afforded in these columns.

(33) A. G. W. asks: Is it an accepted theory by physiologists that each individual at birth is endowed with a certain amount of "life power," vital force, which is or may be expended, but never regained? A. No.

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(34) J. H. H. W. asks: 1. What battery power is required to decompose the ferrocyanide in Bain's telegraph? A. A current of one Weber or less is sufficient. 2. Would more or less be required if starch paste and iodide of potassium were substituted? A. Less, if an excess of starch is not used, and the paper not too thick or dry. 3. Would it require less battery power if an induction coil (such as is used in medical batteries) were connected? A. No. 4. Would a common medical magneto-electric machine be strong enough for the same purpose? A Yes. 5. What is "sludge" acid? A. The name has been applied to the impure oil of vitriol from one of the operations in the purification of petroleum.

(35) J. A asks: Will the inhalation, 4 or 5 hours daily of vapor rising from a vat containing a solution of 1 part oxalic acid and 3 parts alkali, in 2,000 parts water at a temperature environing 160° Fah., prove injurious to the health of the operator? A. Probably more injury would result from the constant steaming than from anything the vapor may contain.

(36) G. K. asks: Can water be raised practically for irrigation by means of a siphon out of a well in which the water stands 30 feet below the surface and 3 or 4 feet deep, to irrigate a plain which is about 35 feet below the level of the water in the well, and which (the plain) is about 200 or 300 yards distant from the well? Will such a siphon, of 4 or 6 inches diameter, if the water holds out, flow continually? Can you give me the quantity of water which a siphon of 3, 4, 5, or 6 inches diameter would discharge per minute? A. We do not think you could secure very efficient action under the conditions stated.

(37) W. B. asks: Is there a point that does not move in a revolving perfectly true shaft? A. All of the metal in a revolving shaft moves.

In filing a piece of soft iron I noticed that the filings were magnetized. What caused them to become so? A. Files often become magnetic by use. The filings receive their magnetism from the file.

During the talk last year about the moons of the planet Mars, I noticed that they appeared very plainly in a mirror. But what caused my surprise was that they (the moons) kept the same position in regard to the mirror, not to the poles of the planet. Could you tell me the reason? A. The moons of Mars cannot be seen in an ordinary mirror. You simply saw the reflections of the planet on the two surfaces of the glass.

(38) E. B. L. writes: I have a small boiler and engine called 2 horse power, and we use it at about 60 lbs. pressure. We have water coming to our cellars in a ½ inch enameled iron pipe, distance about 1,200 feet, with a fall of 150 feet. Have I got pressure enough in this pipe of water to force itself into my boiler while running? The water runs about 5 gallons a minute or a trifle over. A. We doubt whether the pressure will be sufficient, but you can easily settle the question by connecting a gauge to the pipe.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

R. McC.—Galena—lead sulphide. A valuable ore of lead.—S. L.—Pyrites—iron sulphide.—J. H. & J. F. S.—It is a bituminous lignite containing 5 to 6 per cent of ash. An excellent fuel.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges with much pleasure the receipt of original papers and contributions on the following subjects:

A Suggestion to Railroad Companies. By H. M.

Color Blindness. By J. B. B.

Vision. By A. Van B.

Time and Motion Model of the Globe. By W. H. T. E.

HINTS TO CORRESPONDENTS.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Many of our correspondents make inquiries which cannot properly be answered in these columns. Such inquiries, if signed by initials only, are liable to be cast into the waste basket.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

June 11, 1878,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

Alloy for making shot, T. W. Sparks 204,856
Amalgamating chloridized ores, J. O. Stewart 204,773
Animal trap, D. R. Nichols 204,753
Animals, device for marking, Housum & Hill 204,736
Axle tree washer, Aspinwall & Clark 204,700
Bale tie, A. Jingels 204,737
Bale tie, Rutherford & Hawkins 204,764
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Bee hive, J. K. P. Venable 204,696
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Brick kiln, E. W. Bingham 204,651
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Oatmeal machine, S. Miles 204,837
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Spool holder, E. Rice 204,758
Spring, vehicle J. Bowman 204,707
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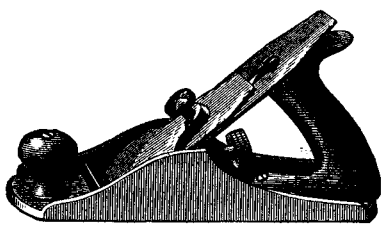

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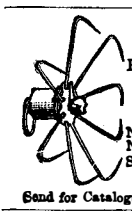

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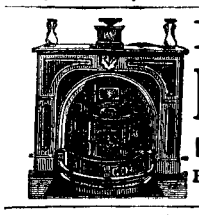

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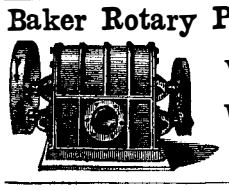

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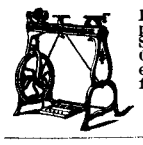

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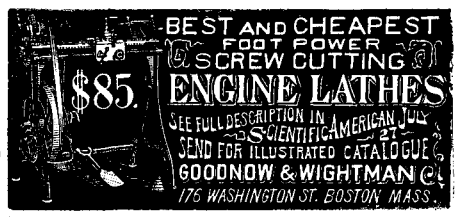

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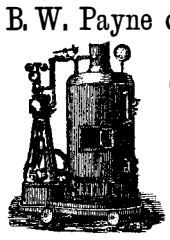

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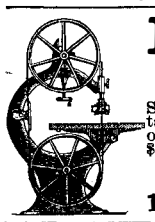

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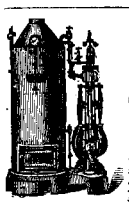

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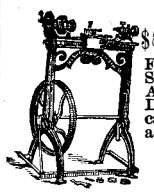

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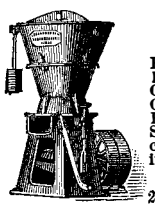

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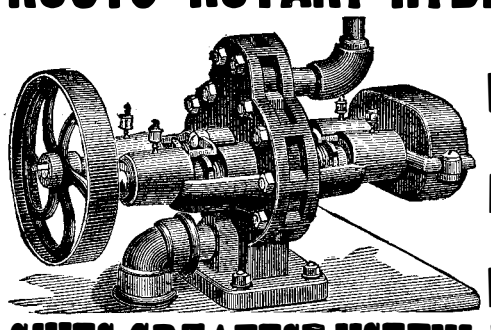

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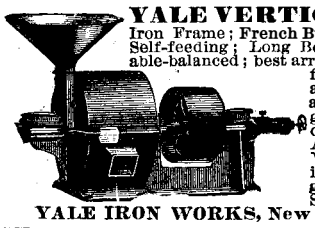

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